



Shelf Hardware Reference

This chapter provides a description of Cisco ONS 15454 hardware for the ANSI and ETSI shelf assemblies. For card descriptions, see [Chapter 14, “Card Reference.”](#) To install equipment, see [Chapter 1, “Install the Shelf and Common Control Cards.”](#)



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

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Note

The Cisco ONS 15454 shelf assemblies are intended for use with telecommunications equipment only.



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

**Warning**

This equipment must be installed and maintained by service personnel as defined by AS/NZS 3260. Incorrectly connecting this equipment to a general purpose outlet could be hazardous. The telecommunications lines must be disconnected 1) before unplugging the main power connector and/or 2) while the front door is open.

**Warning**

The ONS 15454 is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock, key, or other means of security. A restricted access area is controlled by the authority responsible for the location.

**Warning**

The ONS 15454 is suitable for mounting on concrete or other non-combustible surfaces only.

**Caution**

Unused card slots should be filled with a blank faceplate (Cisco P/N 15454-BLANK for ANSI shelves and 15454E-BLANK for ETSI shelves). The blank faceplate ensures proper airflow when operating the ONS 15454 without the front door attached, although Cisco recommends that the front door remain attached.

13.1 Overview

This section provides an introduction to the Cisco ONS 15454 ANSI and the Cisco ONS 15454 ETSI. Install the ONS 15454 in compliance with your local and national electrical codes:

- United States: National Fire Protection Association (NFPA) 70; United States National Electrical Code.
- Canada: Canadian Electrical Code, Part I, CSA C22.1.
- Other countries: If local and national electrical codes, are not available, refer to IEC 364, Part 1 through Part 7.

**Warning**

Dispose of this product according to all national laws and regulations.

13.1.1 Cisco ONS 15454 ANSI

When installed in an equipment rack, the ONS 15454 ANSI assembly is typically connected to a fuse and alarm panel to provide centralized alarm connection points and distributed power for the ONS 15454 ANSI. Fuse and alarm panels are third-party equipment and are not described in this documentation. If you are unsure about the requirements or specifications for a fuse and alarm panel, consult the user documentation for the related equipment. The front door of the ONS 15454 ANSI allows access to the shelf assembly, fan-tray assembly, and cable-management area. The backplanes provide access to alarm contacts, external interface contacts, power terminals, and BNC/SMB connectors.

**Warning**

The ONS 15454 ANSI relies on the protective devices in the building installation to protect against short circuit, overcurrent, and grounding faults. Ensure that the protective devices are properly rated to protect the system, and that they comply with national and local codes.

You can mount the ONS 15454 ANSI in a 19- or 23-inch rack (482.6 or 584.2 mm). The shelf assembly weighs approximately 55 pounds (24.94 kg) with no cards installed.

The ONS 15454 ANSI is powered using –48 VDC power. Negative, return, and ground power terminals are accessible on the backplane.

**Note**

The ONS 15454 ANSI is designed to comply with Telcordia GR-1089-CORE Type 2 and Type 4. Install and operate the ONS 15454 ANSI only in environments that do not expose wiring or cabling to the outside plant. Acceptable applications include Central Office Environments (COEs), Electronic Equipment Enclosures (EEEs), Controlled Environment Vaults (CEVs), huts, and Customer Premise Environments (CPEs).

13.1.2 Cisco ONS 15454 ETSI

When installed in an equipment rack, the ONS 15454 ETSI assembly is typically connected to a fuse and alarm panel to provide centralized alarm connection points and distributed power for the ONS 15454 ETSI. Fuse and alarm panels are third-party equipment and are not described in this documentation. If you are unsure about the requirements or specifications for a fuse and alarm panel, consult the user documentation for the related equipment. The front door of the ONS 15454 ETSI allows access to the shelf assembly, fan-tray assembly, and cable-management area. The FMEC cover at the top of the shelf allows access to power connectors, external alarms and controls, timing input and output, and craft interface terminals.

You can mount the ONS 15454 ETSI in an ETSI rack. The shelf assembly weighs approximately 26 kg (57 pounds) with no cards installed. The shelf assembly includes a front door and a Front Mount Electrical Connection (FMEC) cover for added security, a fan tray module for cooling, and extensive cable-management space.

The ONS 15454 ETSI is powered using –48 VDC power. Negative, return, and ground power terminals are connected via the MIC-A/P and the MIC-C/T/P FMECs.

13.2 ONS 15454 ANSI Rack Installation

**Warning**

To prevent the equipment from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 131°F (55°C) unless configured for industrial temperature (I-temp). All I-temp rated components are –40°F to +149°F (–40°C to +65°C). To prevent airflow restriction, allow at least 1 inch (25.4 mm) of clearance around the ventilation openings.

The ONS 15454 ANSI is mounted in a 19- or 23-in. (482.6- or 584.2-mm) equipment rack. The shelf assembly projects five inches (127 mm) from the front of the rack. It mounts in both Electronic Industries Alliance (EIA) standard and Telcordia-standard racks. The shelf assembly is a total of 17 inches (431.8 mm) wide with no mounting ears attached. Ring runs are not provided by Cisco and might hinder side-by-side installation of shelves where space is limited.

The ONS 15454 ANSI measures 18.5 inches (469.9 mm) high, 19 or 23 inches (482.6 or 584.2 mm) wide (depending on which way the mounting ears are attached), and 12 inches (304.8 mm) deep. You can install up to four ONS 15454 ANSIs in a seven-foot (2133.6 mm) equipment rack. The ONS 15454 ANSI must have one inch (25.4 mm) of airspace below the installed shelf assembly to allow air flow to the fan intake. If a second ONS 15454 ANSI is installed underneath the shelf assembly, the air ramp on top of the lower shelf assembly provides the air spacing needed and should not be modified in any way. [Figure 13-1](#) shows the dimensions of the ONS 15454 ANSI.

**Note**

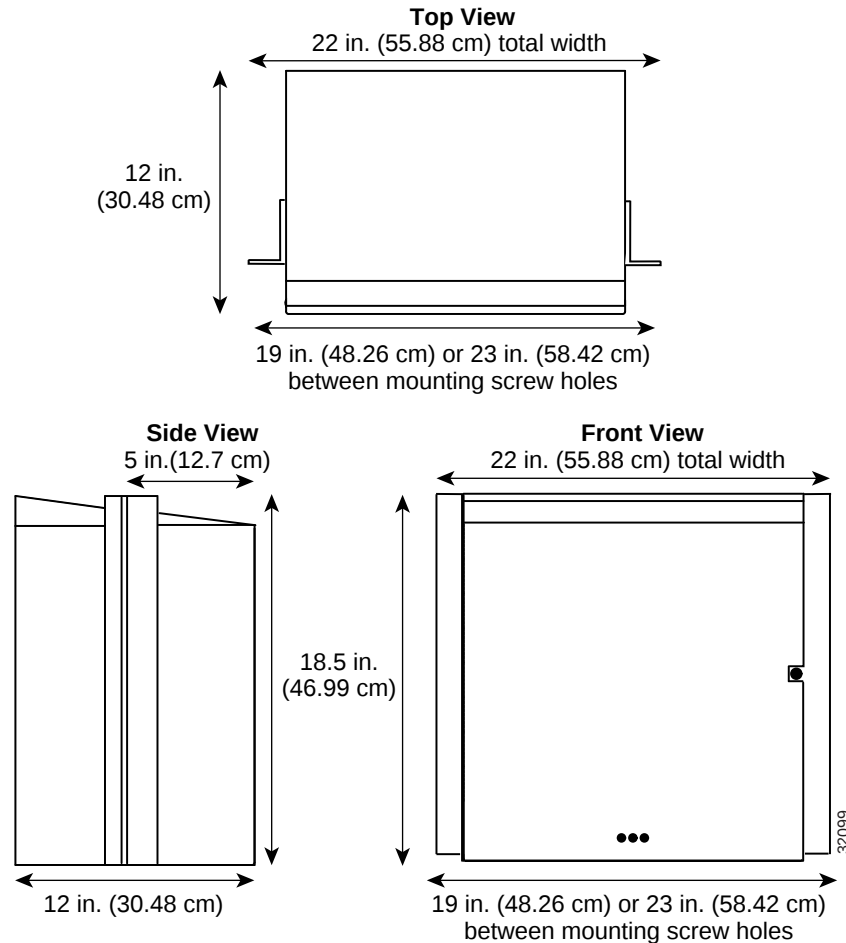
A 10-Gbps-compatible shelf assembly (15454-SA-ANSI or 15454-SA-HD) and fan-tray assembly (15454-FTA3 or 15454-FTA3-T) are required if ONS 15454 ANSI 10-Gbps Cross-Connect (XC10G) cards are installed in the shelf.

**Warning**

The ONS 15454 ANSI should be installed in the lower rack position or mounted above another ONS 15454 ANSI shelf assembly.

**Warning**

The ONS 15454 ANSI must have 1 inch (25.4 mm) of airspace below the installed shelf assembly to allow air flow to the fan intake. The air ramp (the angled piece of sheet metal on top of the shelf assembly) provides this spacing and should not be modified in any way.

Figure 13-1 Cisco ONS 15454 ANSI Dimensions

13.2.1 Reversible Mounting Bracket



Caution

Use only the fastening hardware provided with the ONS 15454 ANSI shelf to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.



Caution

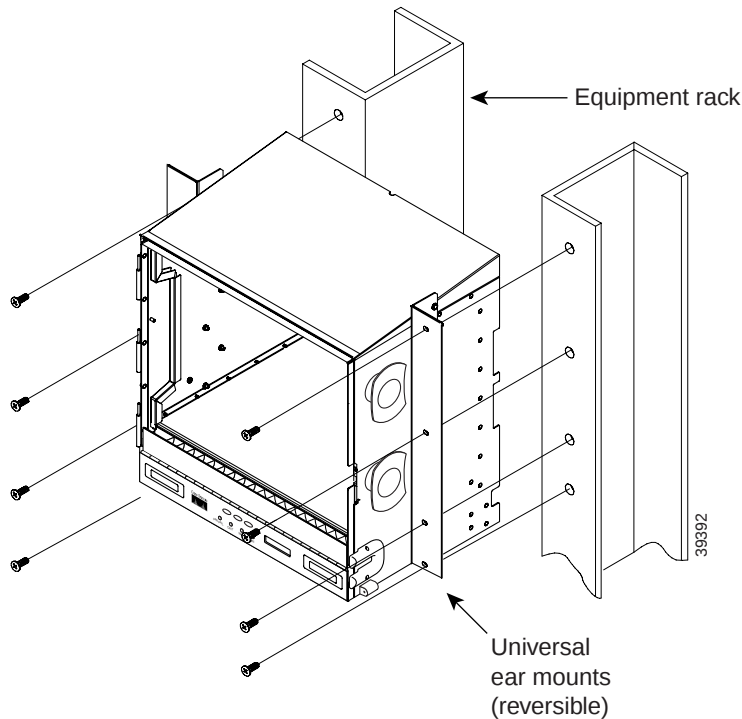
When mounting the ONS 15454 ANSI shelf in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the ONS 15454 ANSI shipping kit, or remove the coating from the threads to ensure electrical continuity.

The shelf assembly comes preset for installation in a 23-inch (584.2 mm) rack, but you can reverse the mounting bracket to fit the smaller 19-inch (482.6 mm) rack.

13.2.2 Mounting a Single Node

Mounting the ONS 15454 ANSI shelf in a rack requires a minimum of 18.5 inches (469.9 mm) of vertical rack space and one additional inch (25.4 mm) for air flow. To ensure the mounting is secure, use two to four #12-24 mounting screws for each side of the shelf assembly. [Figure 13-2](#) shows the rack mounting position for the ONS 15454 ANSI shelf.

Figure 13-2 Mounting an ONS 15454 ANSI Shelf in a Rack



Two people should install the shelf assembly; however, one person can install it using the temporary set screws included. The shelf assembly should be empty for easier lifting. The front door can also be removed to lighten the shelf assembly.

13.2.3 Mounting Multiple Nodes

Most standard (Telcordia GR-63-CORE, 19-inch [482.6-mm] or 23-inch [584.2-mm]) seven-foot (2,133-mm) racks can hold four ONS 15454 ANSI shelves and a fuse and alarm panel. However, unequal flange racks are limited to three ONS 15454 ANSI shelves and a fuse and alarm panel, or four ONS 15454 ANSI shelves using a fuse and alarm panel from an adjacent rack.

If you are using the external (bottom) brackets to install the fan-tray air filter, you can install three shelf assemblies in a standard seven-foot (2,133-m) rack. If you are not using the external (bottom) brackets, you can install four shelf assemblies in a rack. The advantage of using the bottom brackets is that you can replace the filter without removing the fan tray.

13.2.4 ONS 15454 ANSI Bay Assembly

The Cisco ONS 15454 ANSI bay assembly simplifies ordering and installing the ONS 15454 ANSI shelf because it allows you to order shelf assemblies preinstalled in a seven-foot (2,133 mm) rack. The bay assembly is available in a three- or four-shelf configuration. The three-shelf configuration includes three ONS 15454 ANSI shelf assemblies, a prewired fuse and alarm panel, and two cable-management trays. The four-shelf configuration includes four ONS 15454 ANSI shelf assemblies and a prewired fuse and alarm panel. You can order optional fiber channels with either configuration. Installation procedures are included in the *Unpacking and Installing the Cisco ONS 15454 Four-Shelf and Zero-Shelf Bay Assembly* document that ships with the bay assembly.

13.3 ONS 15454 ETSI Rack Installation



Warning

To prevent the equipment from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 131°F (55°C) unless configured for industrial temperature (I-temp). All I-temp rated components are –40°F to +149°F (–40°C to +65°C). To prevent airflow restriction, allow at least 1 inch (25.4 mm) of clearance around the ventilation openings.

The ONS 15454 ETSI (15454-SA-ETSI) is mounted in a 600 x 600-mm (23-inch) or 600 x 300-mm (11.8-inch) equipment cabinet/rack. The shelf assembly projects 240 mm (9.45 inches) from the front of the rack. It mounts in ETSI-standard racks. The shelf assembly is a total of 435 mm (17.35 inches) wide with no mounting ears attached. Ring runs are not provided by Cisco and might hinder side-by-side installation of shelves where space is limited.

The ONS 15454 ETSI measures 616.5 mm (24.27 inches) high, 535 mm (21.06 inches) wide, and 280 mm (11.02 inches) deep. You can install up to three ONS 15454 ETSI shelves in a seven-foot (2133.6 mm) equipment rack. The ONS 15454 ETSI must have one inch (25.4 mm) of airspace below the installed shelf assembly to allow air flow to the fan intake. If a second ONS 15454 ETSI is installed underneath the first shelf assembly, an ETSI air ramp unit must be assembled between the two shelves to ensure adequate air flow.

Figure 13-3 provides the dimensions of the ONS 15454 ETSI.



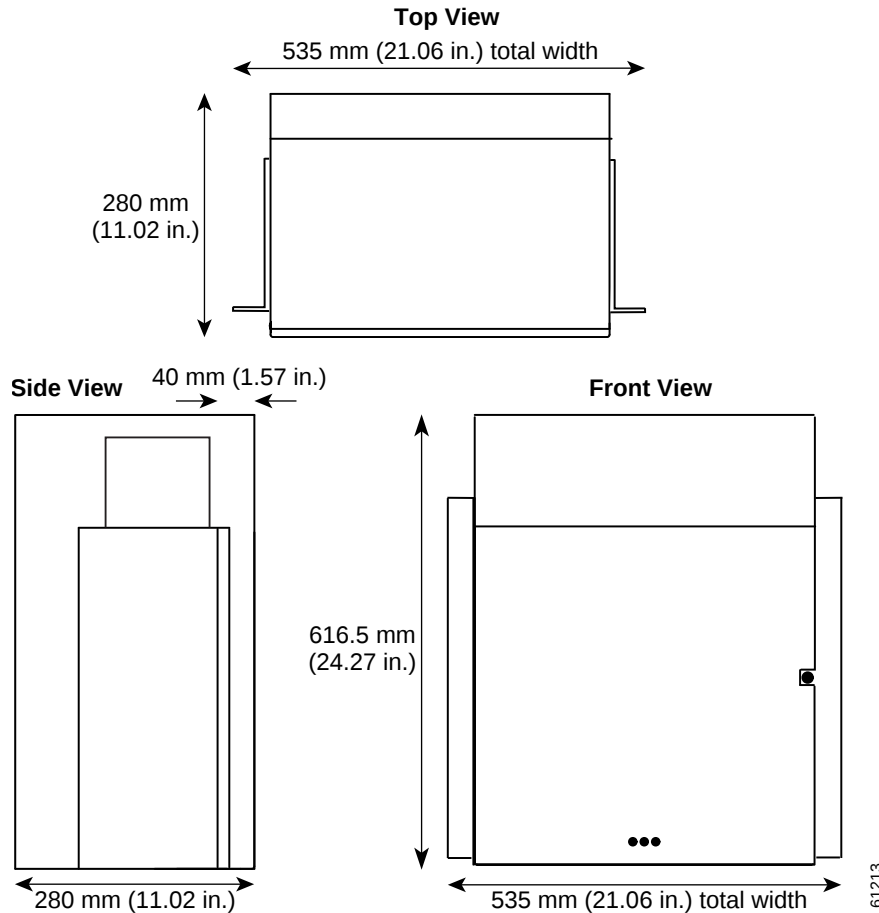
Caution

The standard ETSI racks can hold three ONS 15454 ETSI shelf assemblies and two air ramps. When mounting a shelf assembly in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.



Caution

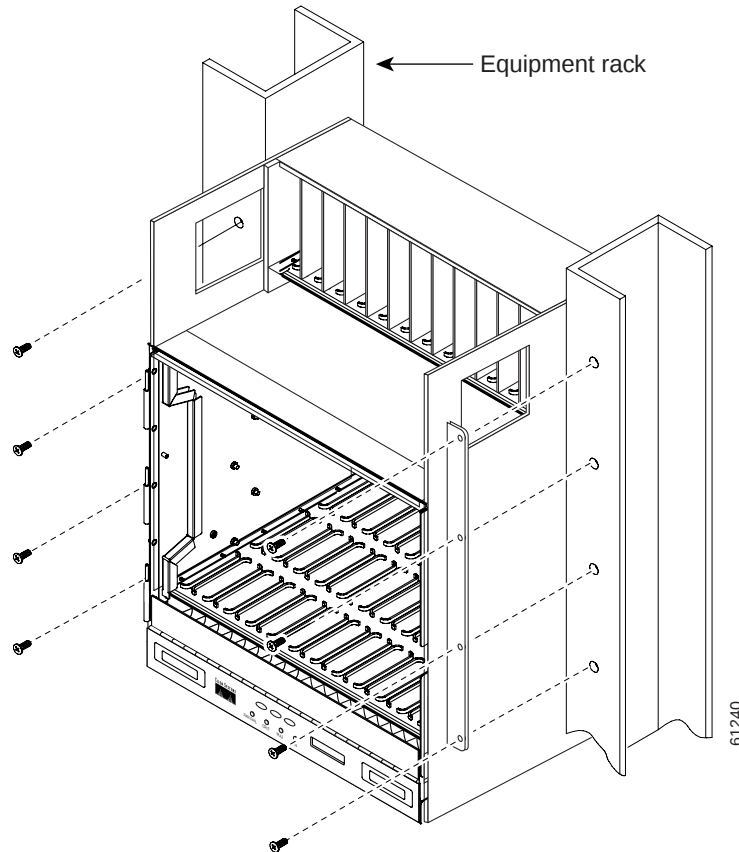
The ONS 15454 ETSI must have 1 inch (25.4 mm) of airspace below the installed shelf assembly to allow air flow to the fan intake. The air ramp (the angled piece of sheet metal on top of the shelf assembly) provides this spacing and should not be modified in any way.

Figure 13-3 ONS 15454 ETSI Dimensions

13.3.1 Mounting a Single Node

The ONS 15454 ETSI requires 616.5 mm (24.24 inch) minimum of vertical rack space and 25 mm (1 inch) below the installed shelf assembly to allow air flow to the fan intake. If a second ONS 15454 ETSI is installed above a shelf assembly, the air ramp between the shelves provides space for air flow. To ensure the mounting is secure, use two to four M6 mounting screws for each side of the shelf assembly. A shelf assembly should be mounted at the bottom of the rack if it is the only unit in the rack.

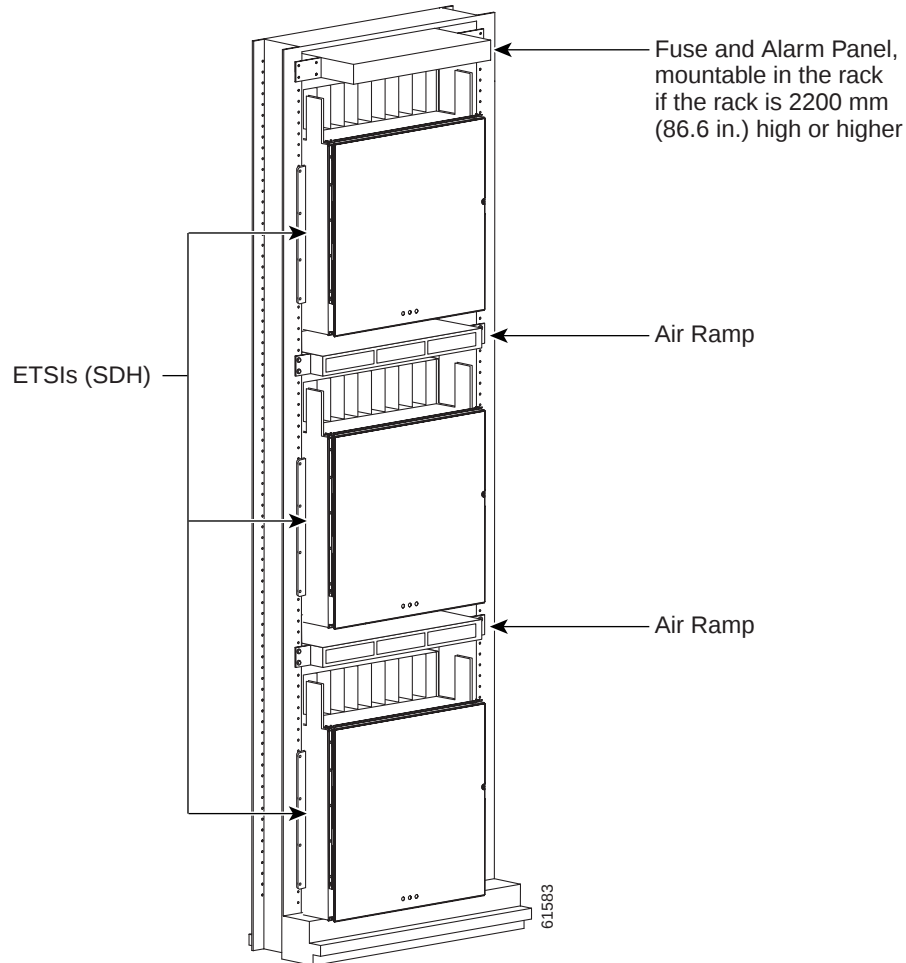
Figure 13-4 shows the rack mounting position for the ONS 15454 ETSI shelf.

Figure 13-4 Mounting an ONS 15454 ETSI Shelf in a Rack

Two people should install the shelf assembly; however, one person can install it using the temporary set screws included. The shelf assembly should be empty for easier lifting. The front door can also be removed to lighten the shelf assembly.

13.3.2 Mounting Multiple Nodes

Most standard (Telcordia GR-63-CORE, 23-inch [584.2 mm]) seven-foot (2,133 mm) racks can hold three ONS 15454 ETSI shelves, two air ramps, and a fuse and alarm panel. [Figure 13-5](#) shows a three-shelf ONS 15454 ETSI bay assembly.

Figure 13-5 Three-Shelf ONS 15454 ETSI Bay Assembly

13.4 FlexLayer and Y-Cable Protection

The Cisco ONS 15454 FlexLayer DWDM system includes the following components:

- Two-channel add or drop flex module
- FlexLayer shelf assembly
- Y-cable FlexLayer module

The FlexLayer shelf assembly is 1 rack unit (RU) high and can be mounted in a 19-inch (482.6-mm) or 23-inch (584.2-mm) rack (two-way mounting brackets). The FlexLayer shelf assembly is used to house the FlexLayer and Y-Cable modules.

13.4.1 FlexLayer Modules

The two-channel add/drop FlexLayer module is a completely passive unidirectional component that allows the insertion or the extraction of two channels within the ONS 15454 channel plan. This module is used only in point-to-point, one-channel, amplified system configurations.

Sixteen specific modules are available to cover the whole 32-channel bandwidth. [Table 13-1](#) shows how the FlexLayer add/drop modules are grouped in relation to the supported channels.

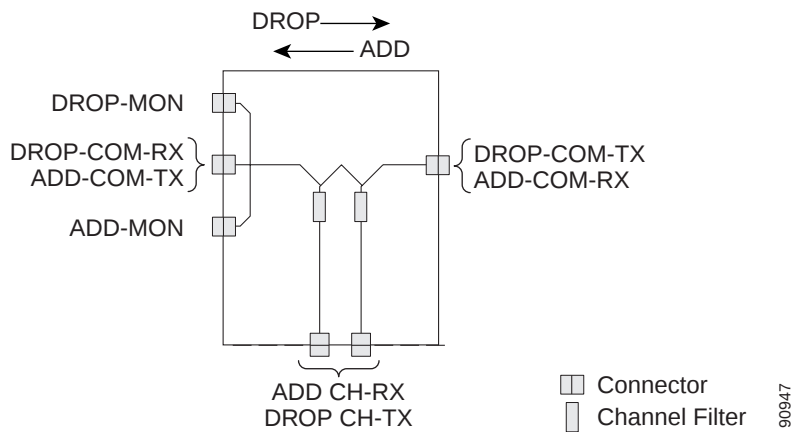
Table 13-1 ONS 15454 R4.7 100-GHz Channel Plan

ITU	Channel ID	Frequency (THz)	Wavelength (nm)	Two-Channel A/D Flex Module
59	30.3	195.9	1530.33	15216-FLB-2-31.1=
58	31.1	195.8	1531.12	
57	31.9	195.7	1531.90	15216-FLB-2-32.6=
56	32.6	195.6	1532.68	
54	34.2	195.4	1534.25	15216-FLB-2-35.0=
53	35.0	195.3	1535.04	
52	35.8	195.2	1535.82	15216-FLB-2-36.6=
51	36.6	195.1	1536.61	
49	38.1	194.9	1538.19	15216-FLB-2-38.9=
48	38.9	194.8	1538.98	
47	39.7	194.7	1539.77	15216-FLB-2-40.5=
46	40.5	194.6	1540.56	
44	42.1	194.4	1542.14	15216-FLB-2-42.9=
43	42.9	194.3	1542.94	
42	43.7	194.2	1543.73	15216-FLB-2-44.5=
41	44.5	194.1	1544.53	
39	46.1	193.9	1546.12	15216-FLB-2-46.9=
38	46.9	193.8	1546.92	
37	47.7	193.7	1547.72	15216-FLB-2-48.5=
36	48.5	193.6	1548.51	
34	50.1	193.4	1550.12	15216-FLB-2-50.9=
33	50.9	193.3	1550.92	
32	51.7	193.2	1551.72	15216-FLB-2-52.5=
31	52.5	193.1	1552.52	
29	54.1	192.9	1554.13	15216-FLB-2-54.9=
28	54.9	192.8	1554.94	
27	55.7	192.7	1555.75	15216-FLB-2-56.5=
26	56.5	192.6	1556.55	

Table 13-1 ONS 15454 R4.7 100-GHz Channel Plan (continued)

ITU	Channel ID	Frequency (THz)	Wavelength (nm)	Two-Channel A/D Flex Module
24	58.1	192.4	1558.17	15216-FLB-2-58.9=
23	58.9	192.3	1558.98	
22	59.7	192.2	1559.79	15216-FLB-2-60.6=
21	60.6	192.1	1560.61	

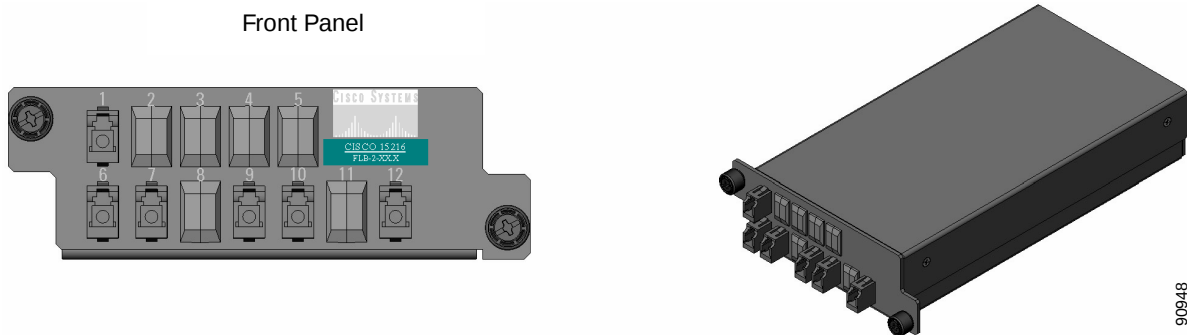
Figure 13-6 shows the unit functional block diagram. In Figure 13-6, the signal flows from left to right when the card is used as a drop component and from right to left when the card is used as an add component.

Figure 13-6 Two-Channel Add/Drop FlexLayer Module Block Diagram

When the unit is used as a drop component, the wave-division multiplexing (WDM) composite signal coming from the DROP-COM-RX port is filtered sequentially by two filters and the filtered channels are dropped at the two DROP-CH-TX ports. The rest of the WDM composite signal is sent to the DROP-COM-TX port. A two-percent tap coupler, DROP-MON, is used to monitor the input WDM composite signal.

When the unit is used as an add component, the added channels coming from the two ADD-CH-RX ports are combined with the WDM composite signal coming from the ADD-COM-RX port. The multiplexed WDM composite signal is sent to the ADD-COM-TX port. A two-percent tap coupler, ADD-MON, is used to monitor the multiplexed WDM composite signal.

Figure 13-7 shows the physical appearance of the ONS 15454 two-channel add/drop FlexLayer module.

Figure 13-7 ONS 15454 Two-Channel Optical Add/Drop FlexLayer Module

Labels are provided to show how the unit ports are mapped. It is the end user's responsibility to label the unit for its intended use (drop or add component).

Figure 13-8 shows how the connectors are mapped and labeled on the front panel when the component is used as a drop component. The COM-RX is mapped to Port 1, the COM-TX is mapped to Port 12, and the two dropped channel TX ports are mapped to Ports 9 and 10. The two-percent tap MON port is mapped to Port 6. Port 7 is not active.

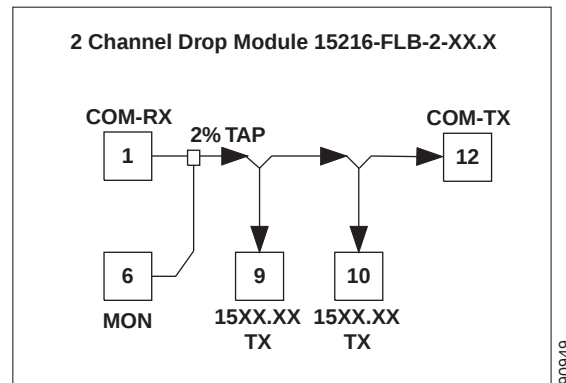
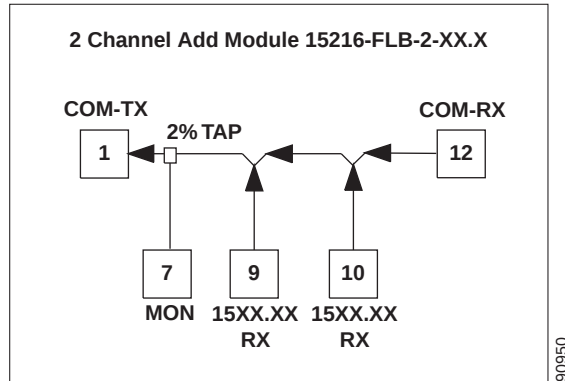
Figure 13-8 Two-Channel Drop Component Connector Mapping and Labeling

Figure 13-9 shows how the connectors are mapped and labeled in the front panel when the component is used as an add component. The COM-TX is mapped to Port 1, the COM-RX is mapped to Port 12, and the added channels are mapped to the two RX Ports 9 and 10. The two-percent tap MON port is mapped to Port 7. Port 6 is not active.

Figure 13-9 Two-Channel Add Component Connector Mapping and Labeling

13.4.2 Y-Cable Protection Module

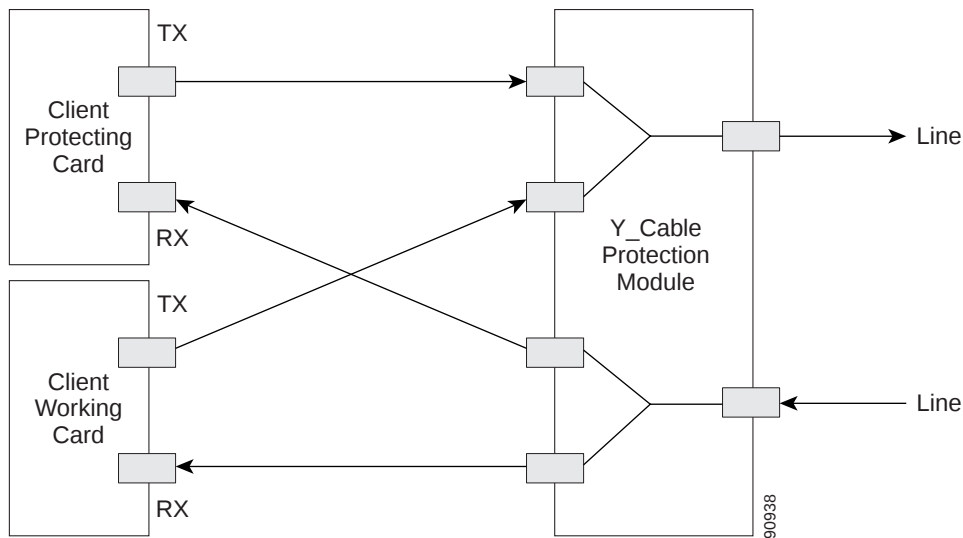
The Y-cable protection module is a bidirectional module. It is equipped with two passive star couplers: one that is used as a splitter and one that is used as a coupler.



Note

Neither this unit nor the other modules of this equipment release can be used for video on demand (VoD) applications.

The purpose of this module is to provide Y-cable protection for transponder cards such as the ONS 15454 multirate and 10-Gbps transponders. (See [Figure 13-10](#).) There are two versions of this unit, one for multimode applications (CS-MM-Y) and one for single-mode applications (CS-SM-Y).

Figure 13-10 Typical Y-Cable Protection Module Configuration

When the module is used in the coupler direction, the individual signals enter the module from the CPL-RX n ports and pass through a passive star coupler to the CPL-TX port.

The coupler is not meant to combine both the protect and working client card signals. The module allows a path for the working client transmit interface to connect to the network in the event the opposite interface in the protection pair should fail (the protect interface switches to the working interface).

When the module is used in the splitter direction, the signal enters the module from the SPL-RX port and is split through a passive star coupler to the SPL-TX n ports. This module, although designed to pass wavelengths associated with the ONS 15454 32-channel plan, is not selective to specific wavelengths (units do not filter wavelengths).

Figure 13-11 shows the unit block diagram of the Y-cable protection module.

Figure 13-11 1:2 Splitter and 2:1 Coupler (Y-Cable Protection) Module Block Diagram

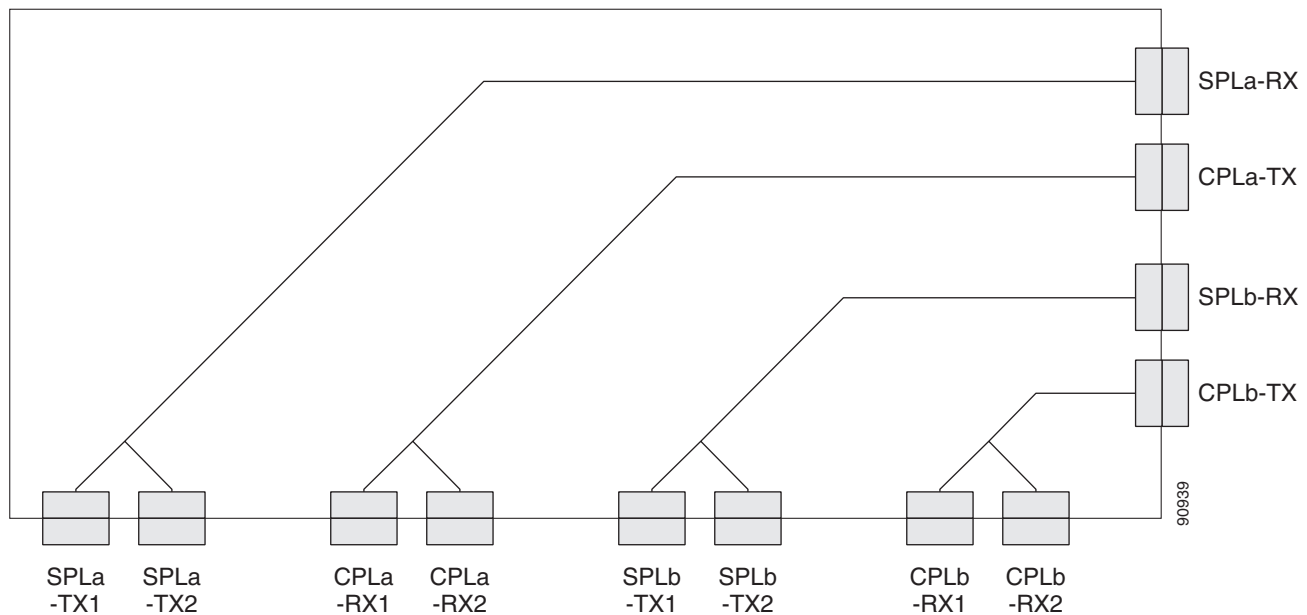


Figure 13-12 and Figure 13-13 show the physical appearance of the ONS 15454 Y-Cable Protection FlexLayer Module. This module has two versions, one for single-mode applications and the other for multimode applications.

Figure 13-12 ONS 15454 Y-Cable Protection FlexLayer Module (Single Mode)

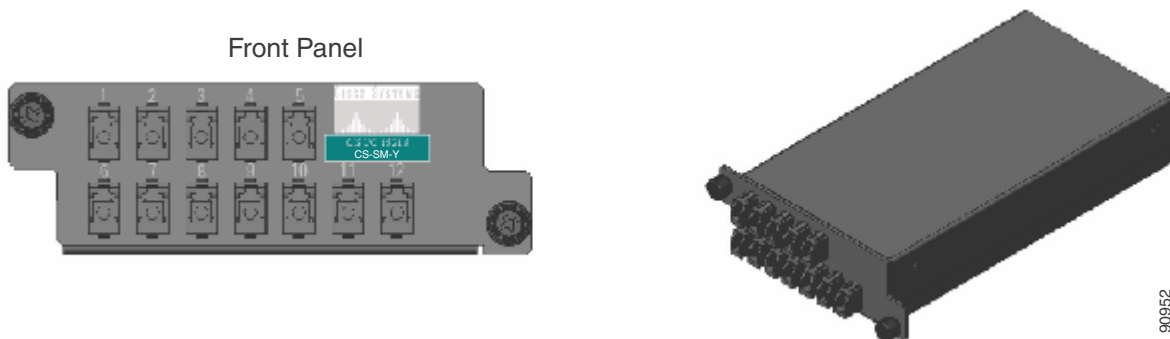


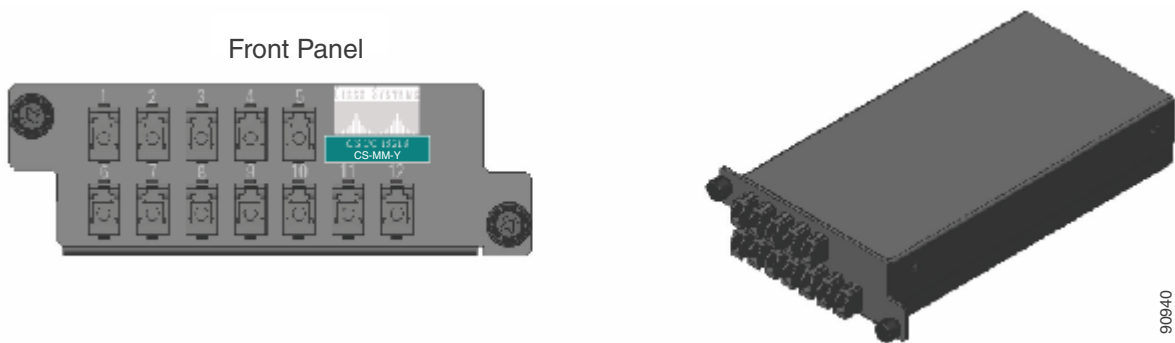
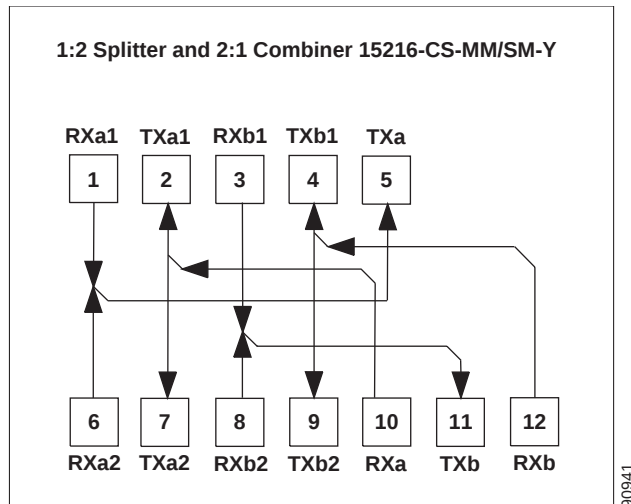
Figure 13-13 ONS 15454 Y-Cable Protection FlexLayer Module (Multimode)

Figure 13-14 shows how the module front panel ports are mapped and labeled. The multimode unit is mapped and labeled the same as the single mode unit.

Figure 13-14 Y-Cable Protection Component Connector Mapping and Labeling

The following muxponder and transponder cards can use Y-cable protection:

- MXP_2.5_10G
- MXP_2.5_10E
- MXP_MR_2.5G
- TXP_MR_10G
- TXP_MR_10E
- TXP_MR_2.5G

13.5 Typical DWDM Rack Layouts

Typical dense wavelength division multiplexing (DWDM) applications might include:

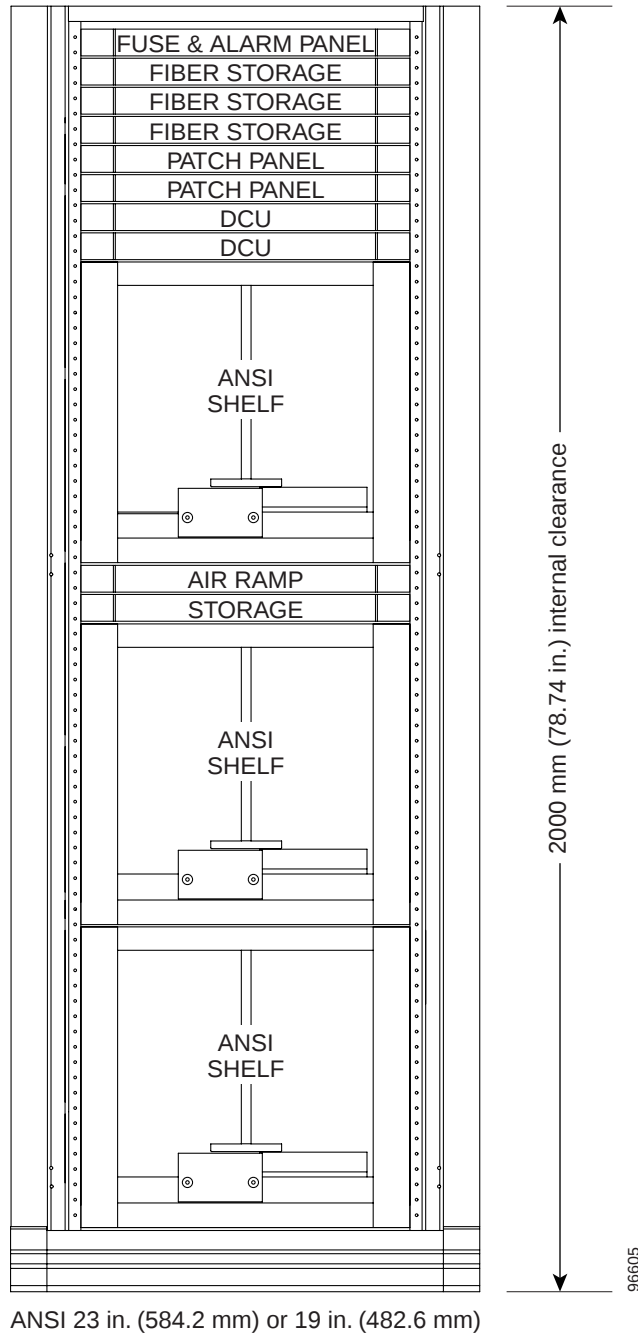
- 3 ONS 15454 shelves

- 1 Dispersion Compensating Unit (DCU)
- 7 patch panels (or fiber storage tray[s])

Or, alternatively:

- 3 ONS 15454 shelves
- 2 DCUs
- 6 patch panels (or fiber storage tray[s])

See [Figure 13-15](#) for a typical rack layout.

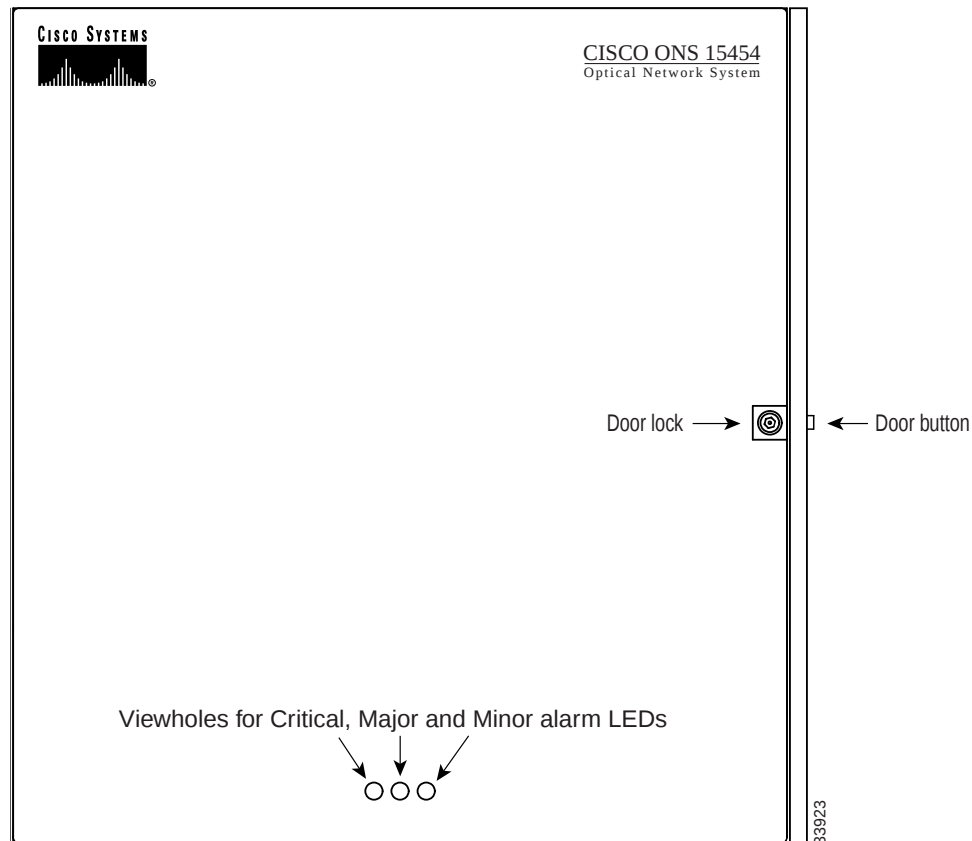
Figure 13-15 Typical DWDM Equipment Layout in an ONS 15454 ANSI Rack

If you are installing a patch panel or fiber storage tray below the ONS 15454 shelf, you must install the air ramp between the shelf and patch panel/fiber tray or leave one rack unit (RU) space open.

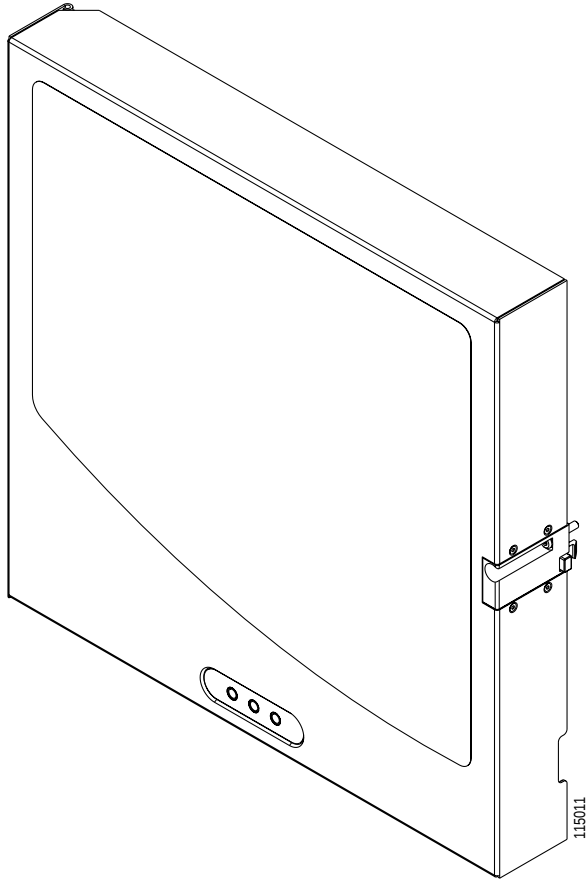
13.6 Front Door

The Critical, Major, and Minor alarm LEDs visible through the front door indicate whether a critical, major, or minor alarm is present anywhere on the ONS 15454 shelf. These LEDs must be visible so technicians can quickly determine if any alarms are present on the ONS 15454 shelf or the network. You can use the LCD to further isolate alarms. The front door (Figure 13-16) provides access to the shelf assembly, cable-management tray, fan-tray assembly, and LCD screen.

Figure 13-16 The ONS 15454 Front Door



The ONS 15454 ANSI ships with a standard door but can also accommodate a deep door and extended fiber clips (15454-DOOR-KIT) to provide additional room for cabling (Figure 13-17). The ONS 15454 ETSI does not support the deep door.

Figure 13-17 Cisco ONS 15454 ANSI Deep Door

The ONS 15454 door locks with a pinned hex key that ships with the shelf assembly. A button on the right side of the shelf assembly releases the door. You can remove the front door to provide unrestricted access to the front of the shelf assembly.

Before you remove the ONS 15454 front door, you must remove the ground strap of the front door ([Figure 13-18](#)).

Figure 13-18 ONS 15454 ANSI Front Door Ground Strap

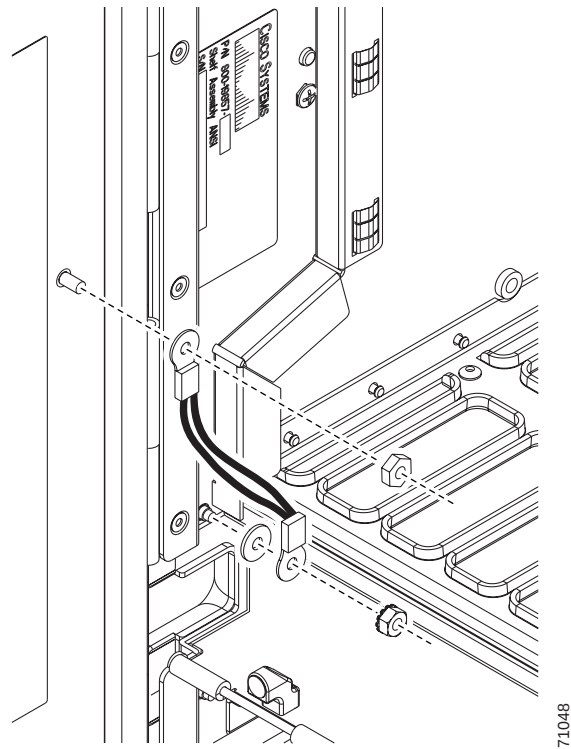


Figure 13-19 shows how to remove the ONS 15454 ANSI front door.

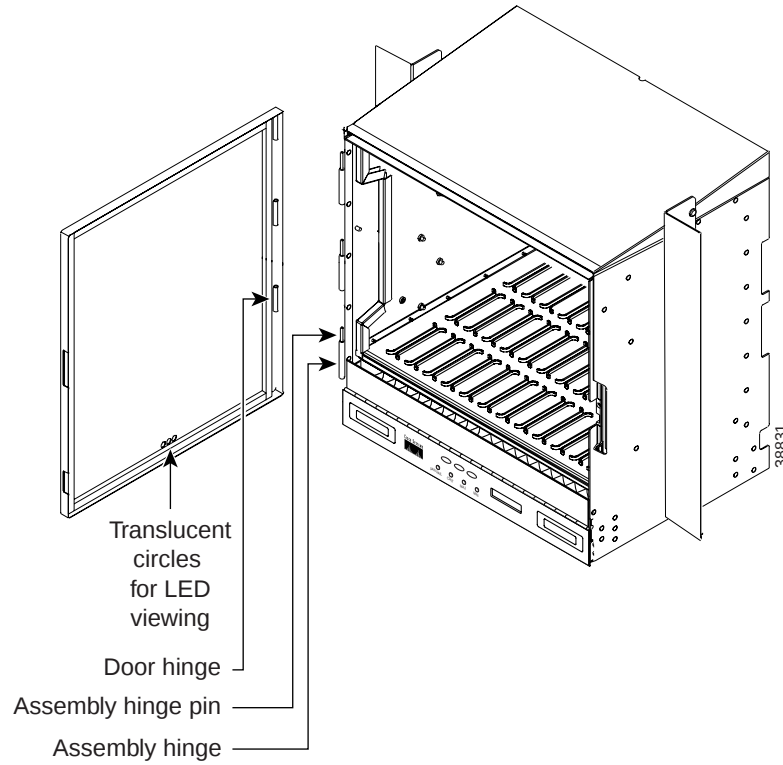
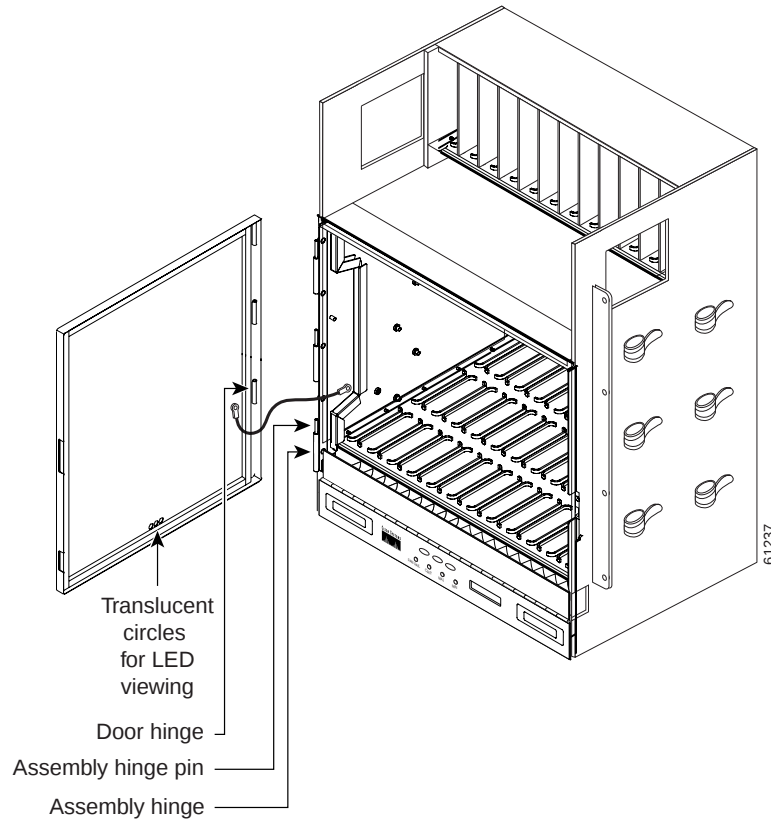
Figure 13-19 Removing the ONS 15454 ANSI Front Door

Figure 13-20 shows how to remove the ONS 15454 ETSI front door.

Figure 13-20 Removing the ONS 15454 ETSI Front Door

An erasable label is pasted on the inside of the front door. You can use the label to record slot assignments, port assignments, card types, node ID, rack ID, and serial number for the ONS 15454. [Figure 13-21](#) shows the erasable label on the ONS 15454 ANSI shelf.

Figure 13-21 ONS 15454 ANSI Front-Door Erasable Label

SLOT ASSIGNMENTS																	
CARD NAME	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
P O R T A S S I G N M E N T S	1						TCC	XC	---	XC	TCC						
	2																
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	10																
	11																
	12																
	13																
	14																
	15																
	16																

SHELF ID:

RACK ID:

SERIAL #:



DANGER

INVISIBLE RADIATION MAY BE EMITTED FROM OPTICAL CARDS AT THE END OF UNTERMINATED FIBER CABLES OR CONNECTORS. DO NOT STARE INTO THE BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS.

CLASS 1 - LASER PRODUCT (CDRH)
CLASS 1M LASER PRODUCT (IEC)



CAUTION: ELECTROSTATIC SENSITIVE DEVICES

ATTN: TO MAINTAIN FCC EMI COMPLIANCE REPLACE FRONT COVER AFTER SERVICING.

IP ADDRESS:

MAC ADDRESS:

PRODUCT COMPLIES WITH RADIATION PERFORMANCE STANDARDS 21CFR 1040.10 AND 1040.11, IEC 60825-1 AND IEC 60825-2.

61840

Figure 13-22 shows the erasable label on the ONS 15454 ETSI shelf.

13-24

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Figure 13-22 ONS 15454 ETSI Front-Door Erasable Label

SHELF ID:		RACK ID:					SERIAL #:				IP ADDRESS:				MAC ADDRESS:			
SLOT NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
CARD NAME							TCC	XC	--	XC	TCC							
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
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42																		

PORT ASSIGNMENTS

⚠ DANGER

GEFAHR

PELIGRO

DANGER

危險

VISIBLE LASER RADIATION MAY BE EMITTED FROM THE OPTICAL CARDS AT THE END OF UNTERMINATED FIBER CABLES OR CONNECTORS. DO NOT STARE INTO THE BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. THIS EQUIPMENT IS A CLASS I (CDRH)/CLASS 1M (IEC) LASER PRODUCT. THIS PRODUCT COMPLIES WITH THE RADIATION PERFORMANCE STANDARDS OF 21 CFR 1040.10 AND 1040.11, IEC 60825-1 AND IEC 60825-2.

Die optischen Karten können möglicherweise am Ende nicht angeschlossener Faserkabel oder -steckverbinder unsichtbare Laserstrahlen emittieren. Nicht in den Strahl blicken, auch nicht direkt mit optischen Instrumenten. Diese Ausrüstung ist ein Laserprodukt der Klasse I (CDRH)/Klasse 1M (IEC). Dieses Produkt erfüllt die Standards für Strahlungsleistung 21 CFR 1040.10 und 1040.11, IEC 60825-1 und IEC 60825-2.

Podría emitirse radiación láser invisible de las tarjetas ópticas en el extremo de los cables o conectores de fibra óptica no terminados. No mirar directamente al haz ni ver directamente con instrumentos ópticos. Este equipo es un producto de láser de clase I (CDRH)/clase 1M (IEC) este producto, cumple con los estándares de desempeño de radiación de 21 CFR 1040.10 y 1040.11, CEI 60825-1 y CEI 60825-2.

ÉMISSION POSSIBLE DE RAYONS LASER À PARTIR DES CARTES OPTIQUES SE TROUVANT À L'EXTREMITÉ DES CONNECTEURS OU DES CÂBLES OPTIQUES NON ABOUTÉS. NE PAS REGARDER LE FASCEAU DIRECTEMENT NI L'EXAMINER À L'AIDE D'INSTRUMENTS OPTIQUES. CET APPAREIL EST UN PRODUIT LASER DE CLASSE I (CDRH)/CLASSE 1M (IEC) CE PRODUIT EST CONFORME AUX NORMES DE PERFORMANCE DE RAYONNEMENT DE 21 CFR 1040.10 ET 1040.11, IEC 60825-1 ET IEC 60825-2.

未使用的光纖電纜或接頭末端的光學卡可能會放射肉眼看不見的雷射線。請勿直接目視光束或以光學儀器直接觀看。

本設備為CLASS I (CDRH) / 第1M類 (IEC)雷射製品。

本產品符合雷射性能標準 (RADIATION PERFORMANCE STANDARDS) 或21CFR1040.10以及1040.11、IEC60825-1和IEC60825-2之規定。

⚠ CAUTION

THE UNIT MAY HAVE MORE THAN ONE POWER CONNECTION. REMOVE ALL CONNECTIONS TO DEENERGIZE THE SYSTEM BEFORE SERVICING TO AVOID ELECTRIC SHOCK.

NO OPERATOR-SERVICEABLE PARTS INSIDE AFTER SERVING TO QUALIFIED PERSONNEL.

TO MAINTAIN EMC COMPLIANCE, REPLACE FRONT COVER AFTER SERVICING.

⚡ ELECTROSTATIC SENSITIVE DEVICES.

VORSICHT

BEI DER ARBEIT MIT VIELSCHNITTIGEN NACH ALLEN STRICHANSCHLÜSSEN VON DER WARTUNG ALLE ANSCHLÜSSE ABTRENKEN, UM DAS SYSTEM VOM NETZ ZU TRENNEN. ANSCHLÜSSE SIND ZU VERMEIDEN.

TEILE IM INNEREN KÖNNEN NACH VON BEZOGENEN GEWARTET WERDEN. WARTUNGSPERSONNEL SIND VON QUALIFIZIERTEN PERSONAL ANZUFORDERN.

UM EMV-KOMPLIANZ ZU ERHALTEN, NACH DER WARTUNG VORDECKEL ABDECKUNG ERSETZEN ABDECKEL.

ELEKTROSTATISCHE EMPFINDLICHE GERÄTE.

PRECAUCIÓN

ES POSIBLE QUE ESTE EQUIPO TENGA MÁS DE UNA CONEXIÓN ELÉCTRICA. PARA DETENER CUALQUIER ELECTRICIDAD, DESCONECTE TODAS LAS CONEXIONES ELÉCTRICAS DEL SISTEMA ANTES DE HACER REPARACIONES.

ESTO EQUIPO NO TIENE PARTES QUE PUEDAN SER REPARADAS POR EL USUARIO. LAS REPARACIONES DEBEN SER HECHAS POR PERSONAL CALIFICADO.

PARA CUMPLIR CON LA LEGISLACIÓN EUROPEA EN MATERIA DE ELECTROMAGNETISMO, MANTENGA LA CUBIERTA DELANTERÍA DESPUÉS DE HACER REPARACIONES.

DISPOSITIVOS SENSIBLES A LA ELECTRICIDAD ESTÁTICA.

ATTENTION

CETTE UNITÉ PEUT DISPOSER DE PLUSIEURS RACCORDEMENTS À UNE SOURCE D'ALIMENTATION. POUR ARRÊTER TOUTES LES CONNEXIONS POUR ARRÊTER LE SYSTÈME ET ÉVITER TOUT RISQUE ÉLECTROCHOC, DÉCONNECTEZ-LES AVANT TOUTE RÉPARATION.

L'ÉQUIPEMENT NE CONTIEN PAS D'ÉLÉMENTS QUI PEUVENT ÊTRE RÉPARÉS. SEULEMENT LE PERSONNEL QUALIFIÉ DOIT RÉPARER L'ÉQUIPEMENT.

REMPLACEZ LE COUVERCLE AVANT APRÈS AVOIR RÉALISÉ L'INTERVENTION CONFORMÉMENT AUX NORMES ENNE.

APPAREILS SENSIBLES À L'ÉLECTRICITÉ STATIQUE.

注意

本設備可能有一部以上之供電連接線。請在維修前將所有連接線拆除，以斷開系統之電源，並避免電擊之危險。

內部零件係由合格之專業技師進行維修，請勿擅自嘗試自行維修。

為了保持符合EMC之規定，請在維修後將前蓋裝好。

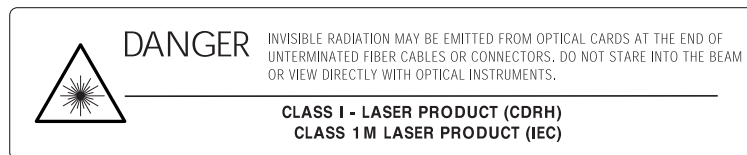
本設備對靜電敏感。

P/N: 47-12460-01

78098

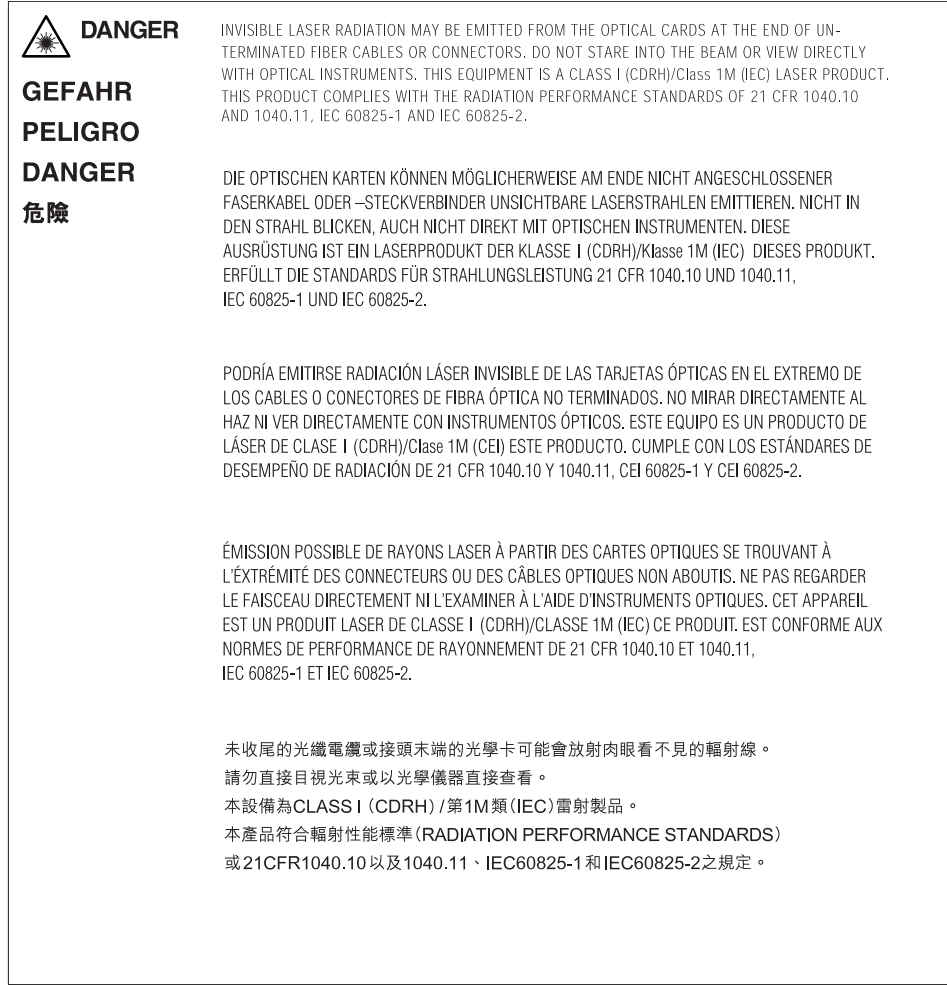
The front door label also includes the Class I and Class 1M laser warning. See [Figure 13-23](#) for the ONS 15454 ANSI laser warning and [Figure 13-24](#) for the ONS 15454 ETSI laser warning.

Figure 13-23 Laser Warning on the ONS 15454 ANSI Front-Door Label



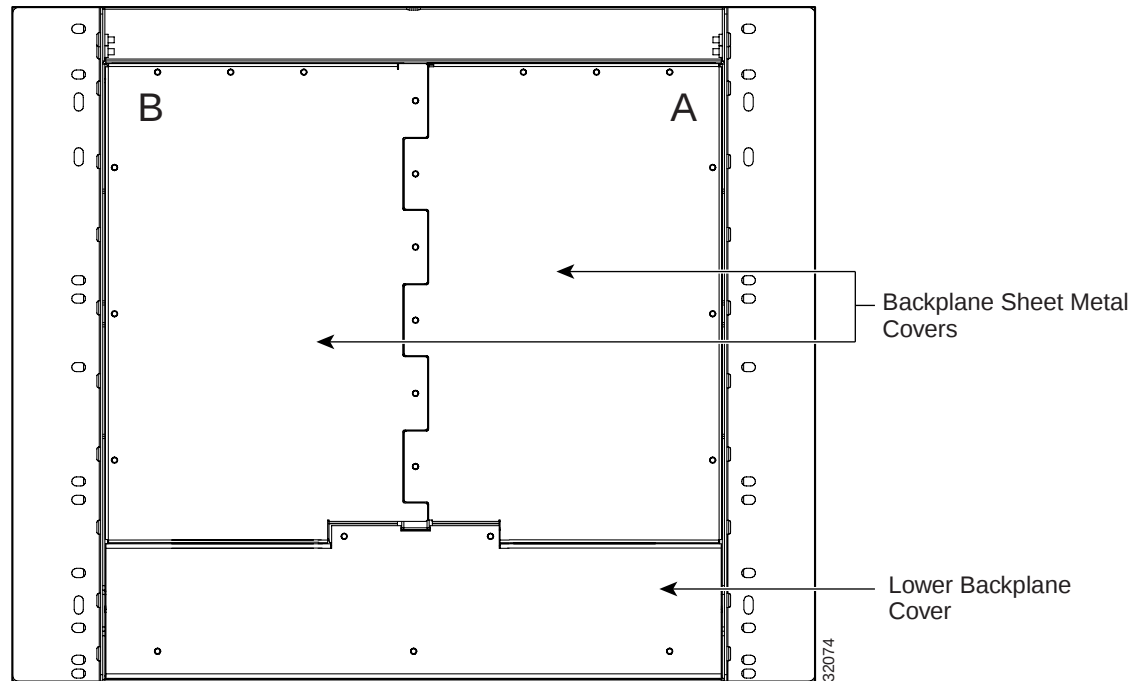
67575

Figure 13-24 Laser Warning on the ONS 15454 ETSI Front-Door Label



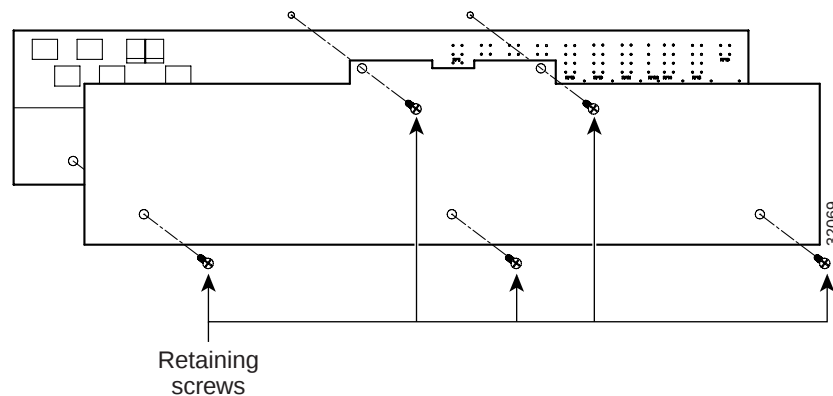
13.7 ONS 15454 ANSI Backplane Covers

If a backplane does not have an electrical interface assembly (EIA) panel installed, it should have two sheet metal backplane covers (one on each side of the backplane). See [Figure 13-25](#). Each cover is held in place with nine 6-32 x 3/8 inch Phillips screws.

Figure 13-25 Backplane Covers

13.7.1 Lower Backplane Cover

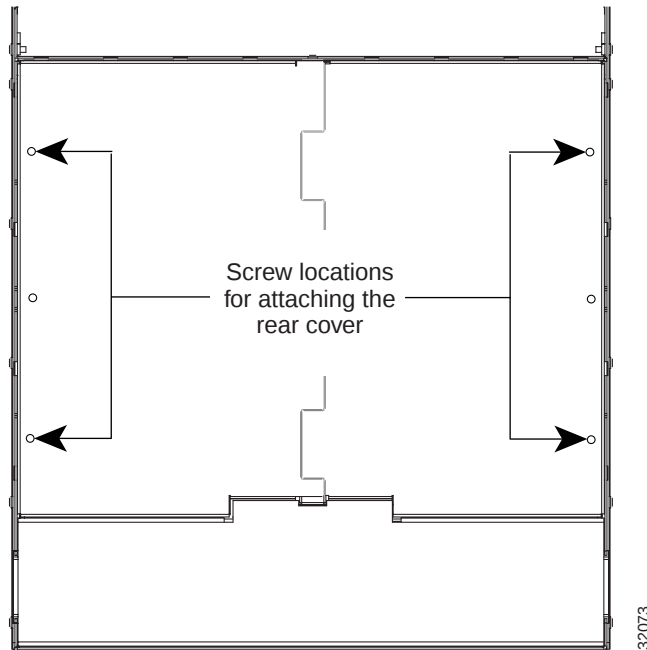
The lower section of the ONS 15454 ANSI backplane is covered by either a clear plastic protector (15454-SA-ANSI) or a sheet metal cover (15454-SA-HD), which is held in place by five 6-32 x 1/2 inch screws. Remove the lower backplane cover to access the alarm interface panel (AIP), alarm pin fields, frame ground, and power terminals ([Figure 13-26](#)).

Figure 13-26 Removing the Lower Backplane Cover

13.7.2 Rear Cover

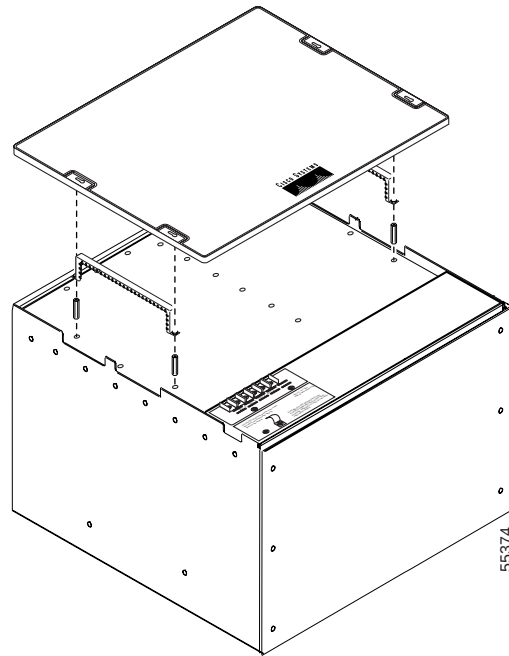
The ONS 15454 ANSI has an optional clear plastic rear cover. This clear plastic cover provides additional protection for the cables and connectors on the backplane. [Figure 13-27](#) shows the rear cover screw locations.

Figure 13-27 Backplane Attachment for Cover



You can also install the optional spacers if more space is needed between the cables and rear cover ([Figure 13-28](#)).

Figure 13-28 *Installing the Plastic Rear Cover with Spacers*



13.7.3 Alarm Interface Panel

The AIP is located above the alarm contacts on the lower section of the backplane. The AIP provides surge protection for the ONS 15454 ANSI. It also provides an interface from the backplane to the fan-tray assembly and LCD. The AIP plugs into the backplane using a 96-pin DIN connector and is held in place with two retaining screws. The panel has a nonvolatile memory chip that stores the unique node address (MAC address).



Note

The 5-A AIP (73-7665-XX) is required when installing the new fan-tray assembly (15454-FTA3), which comes preinstalled on the shelf assembly (15454-SA-ANSI or 15454-SA-HD).



Note

The MAC address identifies the nodes that support circuits. It allows Cisco Transport Controller (CTC) to determine circuit sources, destinations, and spans. The TCC2 cards in the ONS 15454 ANSI also use the MAC address to store the node database.



Note

A blown fuse on the AIP board can cause the LCD display to go blank.

13.7.4 Alarm Interface Panel Replacement

If the AIP fails, a MAC Fail alarm displays on the CTC Alarms menu and/or the LCD display on the fan-tray assembly goes blank. To perform an in-service replacement of the AIP, you must contact the Cisco Technical Assistance Center (Cisco TAC). For contact information, see [Obtaining Technical Assistance, page ix](#).

You can replace the AIP on an in-service system without affecting traffic (except Ethernet traffic on nodes running a software release earlier than Release 4.0). The circuit repair feature allows you to repair circuits affected by MAC address changes on one node at a time. Circuit repair works when all nodes are running the same software version. Each individual AIP upgrade requires an individual circuit repair; if AIPs are replaced on two nodes, the circuit repair must be performed twice. Always replace an AIP during a maintenance window.



Caution

Do not use a 2-A AIP with a 5-A fan-tray assembly; doing so causes a blown fuse on the AIP.



Note

Ensure that all nodes in the affected network are running the same software version before replacing the AIP and repairing circuits. If you need to upgrade nodes to the same software version, no hardware should be changed or circuit repair performed until after the software upgrade is complete.

13.8 ONS 15454 ETSI Front Mount Electrical Connection

The ONS 15454 ETSI positive and negative power terminals are located on FMEC cards in the Electrical Facility Connection Assembly (EFCA). The ground connection is the grounding receptacle on the side panel of the shelf.

The ONS 15454 ETSI EFCA at the top of the shelf has 12 FMEC slots numbered sequentially from left to right (18 to 29). Slots 18 to 22 and 25 to 29 provide electrical connections. Slots 23 and 24 host the MIC-A/P and MIC-C/T/P cards, respectively. The MIC-A/P and the MIC-C/T/P cards are also used to connect alarm, timing, LAN, and craft connections to the ONS 15454 ETSI.

For more information about the MIC-A/P and MIC-C/T/P, which are required for power supply as well as alarm, timing, and LAN connections, see [Chapter 14, “Card Reference.”](#)

13.9 ONS 15454 ANSI Alarm Expansion Panel

The optional ONS 15454 ANSI alarm expansion panel (AEP) can be used with the Alarm Interface Controller–International card (AIC-I) card to provide an additional 48 dry alarm contacts for the ONS 15454 ANSI: 32 inputs and 16 outputs. The AEP is a printed circuit board assembly that is installed on the backplane. [Figure 13-29](#) shows the AEP board; the left connector is the input connector and the right connector is the output connector.

The AIC-I without an AEP already contains direct alarm contacts. These direct AIC-I alarm contacts are routed through the backplane to wire-wrap pins accessible from the back of the shelf. If you install an AEP, you cannot use the alarm contacts on the wire-wrap pins. For further information about the AIC-I, see [Chapter 14, “Card Reference.”](#)

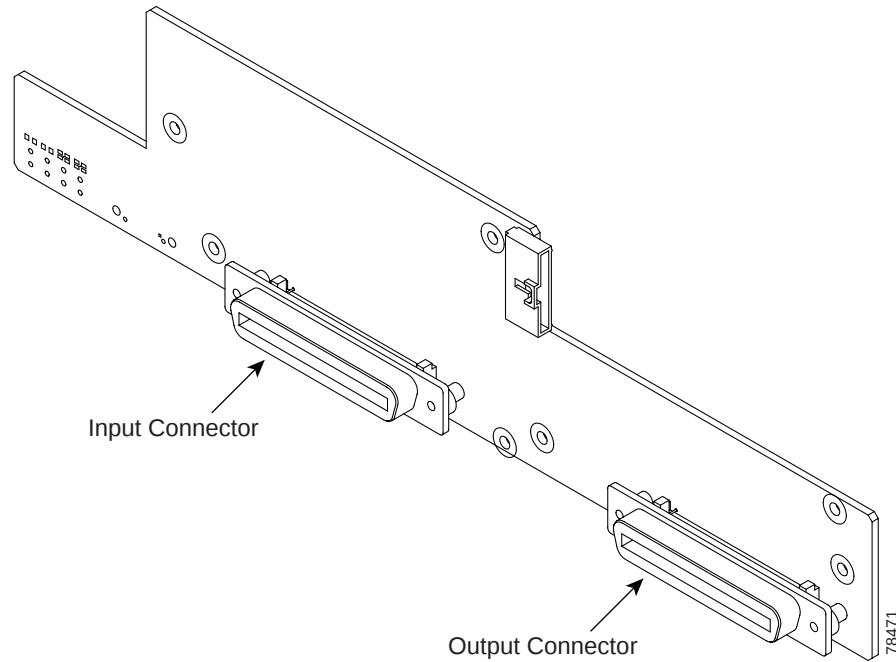
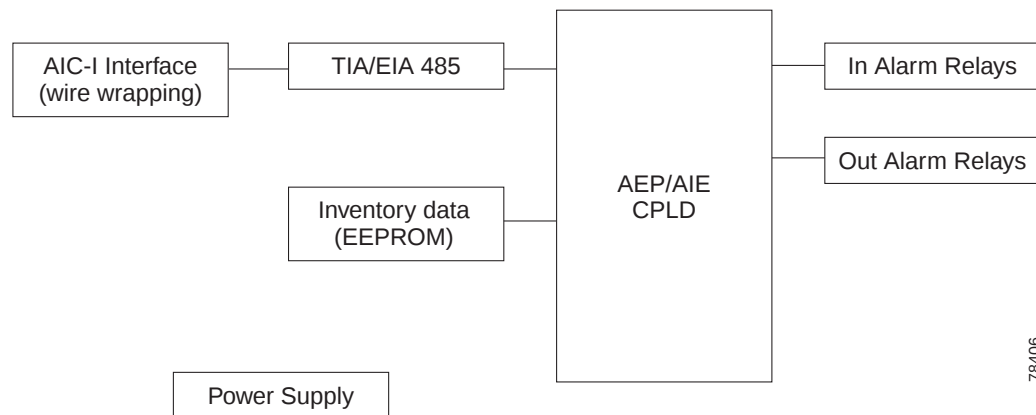
Figure 13-29 AEP Printed Circuit Board Assembly

Figure 13-30 shows the AEP block diagram.

Figure 13-30 AEP Block Diagram

Each AEP alarm input port has provisionable label and severity. The alarm inputs have optocoupler isolation. They have one common 32-VDC output and a maximum of 2 mA per input. Each opto metal oxide semiconductor (MOS) alarm output can operate by definable alarm condition, a maximum open circuit voltage of 60 VDC, and a maximum current of 100 mA. See the “[20.7 External Alarms and Controls](#)” section on page 20-13 for further information.

13.9.1 Wire-Wrap and Pin Connections

Figure 13-31 shows the wire-wrapping connections on the backplane.

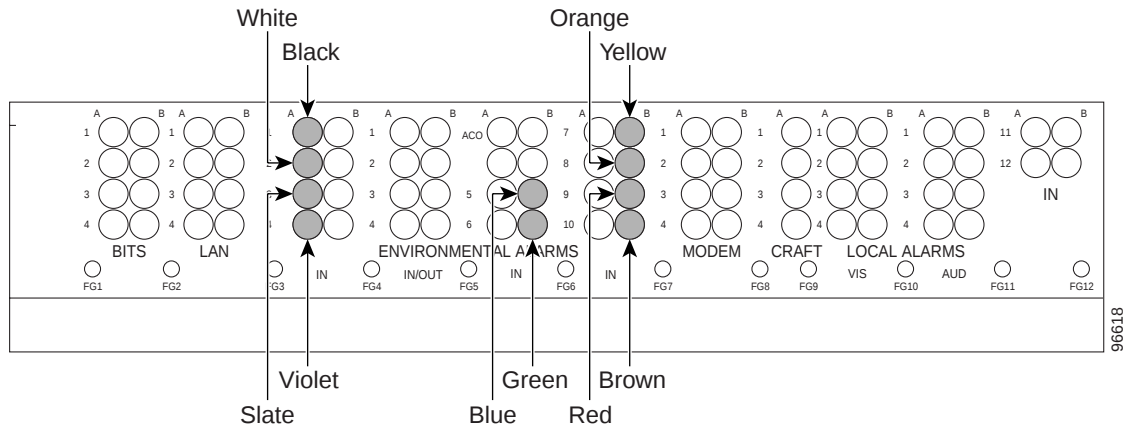
Figure 13-31 AEP Wire-Wrap Connections to Backplane Pins

Table 13-2 shows the backplane pin assignments and corresponding signals on the AIC-I and AEP.

Table 13-2 Pin Assignments for the AEP

AEP Cable Wire	Backplane Pin	AIC-I Signal	AEP Signal
Black	A1	GND	AEP_GND
White	A2	AE_+5	AEP_+5
Slate	A3	VBAT–	VBAT–
Violet	A4	VB+	VB+
Blue	A5	AE_CLK_P	AE_CLK_P
Green	A6	AE_CLK_N	AE_CLK_N
Yellow	A7	AE_DIN_P	AE_DOUT_P
Orange	A8	AE_DIN_N	AE_DOUT_N
Red	A9	AE_DOUT_P	AE_DIN_P
Brown	A10	AE_DOUT_N	AE_DIN_N

Figure 13-32 is a circuit diagram of the alarm inputs. (Inputs 1 and 32 are shown in the example.)

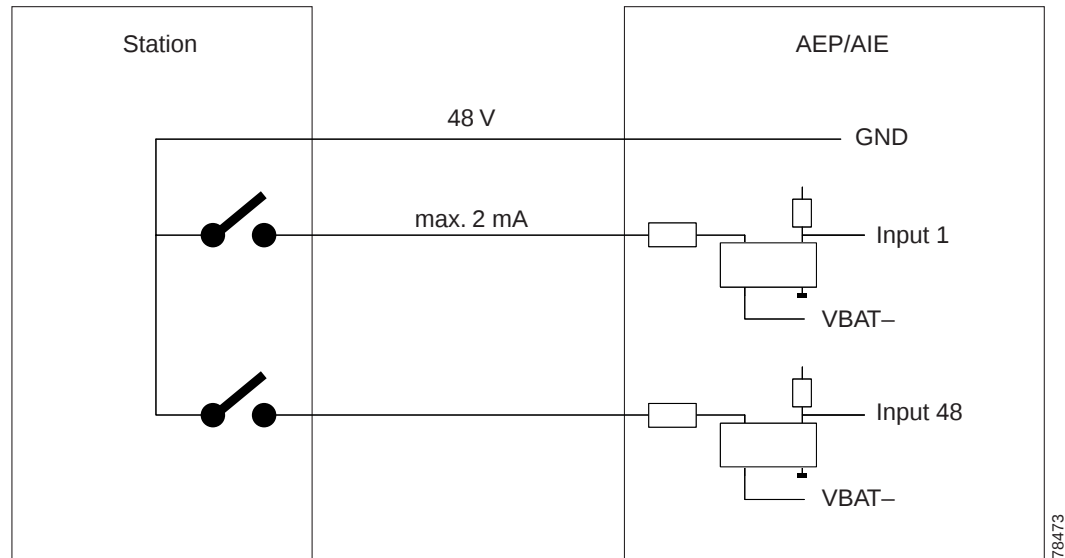
Figure 13-32 Alarm Input Circuit Diagram

Table 13-3 lists the connections to the external alarm sources.

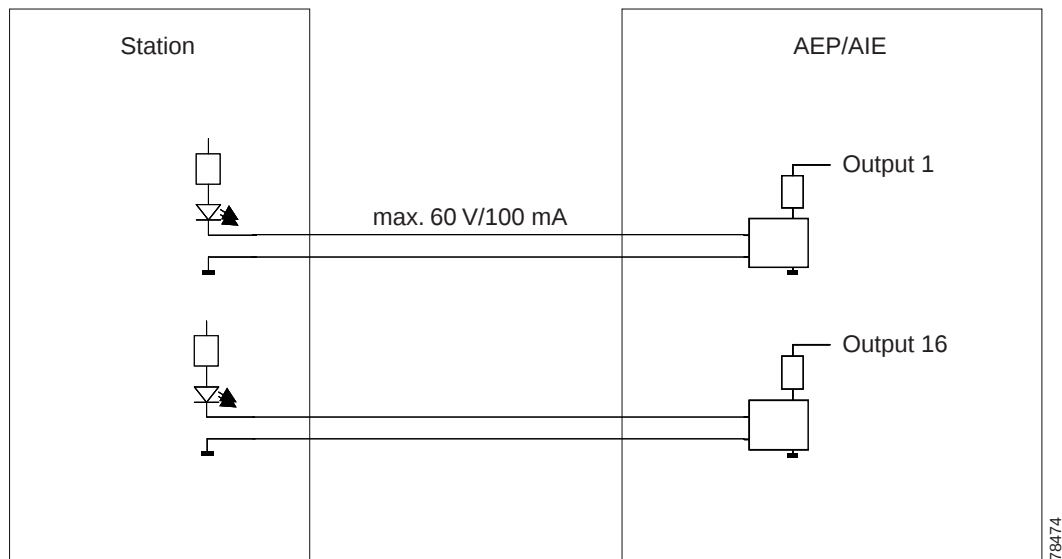
Table 13-3 Alarm Input Pin Association

AMP Champ Pin Number	Signal Name	AMP Champ Pin Number	Signal Name
1	ALARM_IN_1–	27	GND
2	GND	28	ALARM_IN_2–
3	ALARM_IN_3–	29	ALARM_IN_4–
4	ALARM_IN_5–	30	GND
5	GND	31	ALARM_IN_6–
6	ALARM_IN_7–	32	ALARM_IN_8–
7	ALARM_IN_9–	33	GND
8	GND	34	ALARM_IN_10–
9	ALARM_IN_11–	35	ALARM_IN_12–
10	ALARM_IN_13–	36	GND
11	GND	37	ALARM_IN_14–
12	ALARM_IN_15–	38	ALARM_IN_16–
13	ALARM_IN_17–	39	GND
14	GND	40	ALARM_IN_18–
15	ALARM_IN_19–	41	ALARM_IN_20–
16	ALARM_IN_21–	42	GND
17	GND	43	ALARM_IN_22–
18	ALARM_IN_23–	44	ALARM_IN_24–
19	ALARM_IN_25–	45	GND

Table 13-3 Alarm Input Pin Association (continued)

AMP Champ Pin Number	Signal Name	AMP Champ Pin Number	Signal Name
20	GND	46	ALARM_IN_26–
21	ALARM_IN_27–	47	ALARM_IN_28–
22	ALARM_IN_29–	48	GND
23	GND	49	ALARM_IN_30–
24	ALARM_IN_31–	50	—
25	ALARM_IN_+	51	GND1
26	ALARM_IN_0–	52	GND2

Figure 13-33 is a circuit diagram of the alarm outputs. (Outputs 1 and 16 are shown in the example.)

Figure 13-33 Alarm Output Circuit Diagram

Use the pin numbers in Table 13-4 to connect to the external elements being switched by external controls.

Table 13-4 Pin Association for Alarm Output Pins

AMP Champ Pin Number	Signal Name	AMP Champ Pin Number	Signal Name
1	—	27	COM_0
2	COM_1	28	—
3	NO_1	29	NO_2
4	—	30	COM_2
5	COM_3	31	—
6	NO_3	32	NO_4

Table 13-4 Pin Association for Alarm Output Pins (continued)

AMP Champ Pin Number	Signal Name	AMP Champ Pin Number	Signal Name
7	—	33	COM_4
8	COM_5	34	—
9	NO_5	35	NO_6
10	—	36	COM_6
11	COM_7	37	—
12	NO_7	38	NO_8
13	—	39	COM_8
14	COM_9	40	—
15	NO_9	41	NO_10
16	—	42	COM_10
17	COM_11	43	—
18	NO_11	44	NO_12
19	—	45	COM_12
20	COM_13	46	—
21	NO_13	47	NO_14
22	—	48	COM_14
23	COM_15	49	—
24	NO_15	50	—
25	—	51	GND1
26	NO_0	52	GND2

13.9.2 AEP Specifications

The AEP has the following specifications:

- Alarm inputs
 - Number of inputs: 32
 - Optocoupler isolated
 - Label customer provisionable
 - Severity customer provisionable
 - Common 32 V output for all alarm inputs
 - Each input limited to 2 mA
 - Termination: 50-pin AMP champ connector
- Alarm outputs
 - Number of outputs: 16
 - Switched by opto MOS (metal oxide semiconductor)

- Triggered by definable alarm condition
- Maximum allowed open circuit voltage: 60 VDC
- Maximum allowed closed circuit current: 100 mA
- Termination: 50-pin AMP champ connector
- Environmental
 - Overvoltage protection: as in ITU-T G.703 Annex B
 - Operating temperature: –40 to +65 degrees Celsius (–40 to +149 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 3.00 W max., from +5 VDC from AIC-I, 10.2 BTU/hr max.
- Dimensions of AEP board
 - Height: 20 mm (0.79 in.)
 - Width: 330 mm (13.0 in.)
 - Depth: 89 mm (3.5 in.)
 - Weight: 0.18 kg (0.4 lb)
- Compliance: Installed ONS 15454 cards comply with these safety standards:
IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

13.10 Cable Routing and Management

The ONS 15454 cable management facilities include the following:

- Fiber patch panels
- A cable-routing channel (behind the fold-down door) that runs the width of the shelf assembly ([Figure 13-34 on page 13-37](#))
- Plastic horseshoe-shaped fiber guides at each side opening of the cable-routing channel that ensure that the proper bend radius is maintained in the fibers ([Figure 13-35 on page 13-38](#))



Note

You can remove the fiber guide, if necessary, to create a larger opening (if you need to route CAT-5 Ethernet cables out the side, for example). To remove the fiber guide, take out the three screws that anchor it to the side of the shelf assembly.

- A fold-down door that provides access to the cable-management tray
- Cable tie-wrap facilities on EIAs that secure cables to the cover panel (ANSI only)
- Reversible jumper routing fins that enable you to route cables out either side by positioning the fins as desired
- Jumper slack storage reels (2) on each side panel that reduce the amount of slack in cables that are connected to other devices



Note

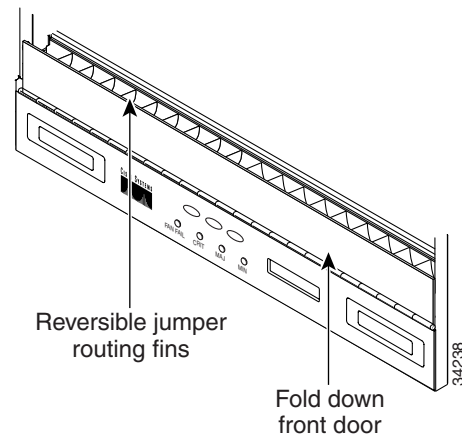
To remove the jumper slack storage reels, take out the screw in the center of each reel.

- Optional fiber management tray (recommended for DWDM nodes)

- Optional tie-down bar (ANSI only)

Figure 13-34 shows the cable management facilities that you can access through the fold-down front door, including the cable-routing channel and the jumper routing fins.

Figure 13-34 Managing Cables on the Front Panel



13.10.1 Fiber Management

The jumper routing fins are designed to route fiber jumpers out of both sides of the shelf. Slots 1 to 6 exit to the left, and Slots 12 to 17 exit to the right. Figure 13-35 shows fibers routed from cards in the left slots, down through the fins, then exiting out the fiber channel to the left. The maximum capacity of the fiber routing channel depends on the size of the fiber jumpers.

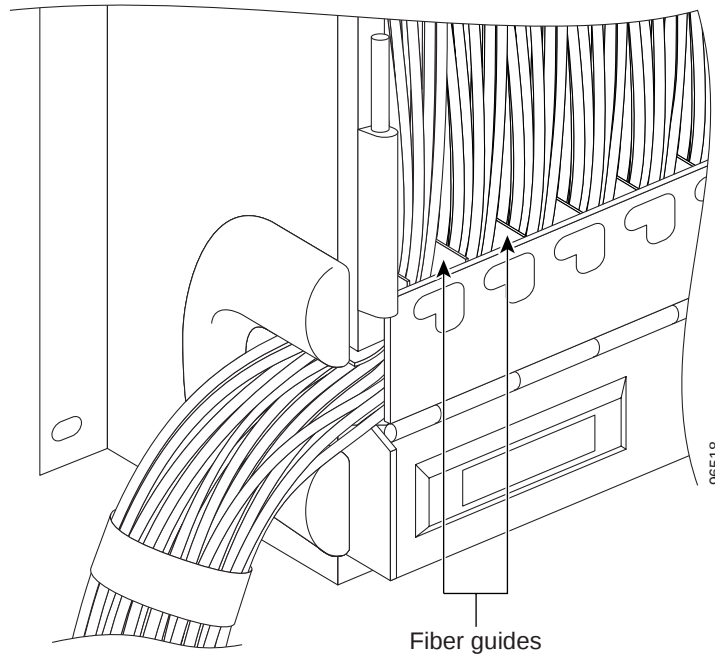
Figure 13-35 Fiber Capacity

Table 13-5 provides the maximum capacity of the fiber channel for one side of an ANSI shelf, depending on fiber size and number of Ethernet cables running through that fiber channel.

Table 13-5 ANSI Fiber Channel Capacity (One Side of the Shelf)

Fiber Diameter	Maximum Number of Fibers Exiting Each Side		
	No Ethernet Cables	One Ethernet Cable	Two Ethernet Cables
1.6 mm (0.6 inch)	144	127	110
2 mm (0.7 inch)	90	80	70
3 mm (0.11 inch)	40	36	32

Table 13-6 provides the maximum capacity of the fiber channel for one side of an ETSI shelf, depending on fiber size and number of Ethernet cables running through that fiber channel.

Table 13-6 ETSI Fiber Channel Capacity (One Side of the Shelf)

Fiber Diameter	Maximum Number of Fibers Exiting Each Side		
	No Ethernet Cables	One Ethernet Cable	Two Ethernet Cables
1.6 mm (0.6 inch)	126	110	94
2 mm (0.7 inch)	80	70	60
3 mm (0.11 inch)	36	31	26

Plan your fiber size according to the number of cards/ports installed in each side of the shelf. For example, if your port combination requires 36 fibers, 3-mm (0.11-inch) fiber is adequate. If your port combination requires 68 fibers, you must use 2-mm (0.7-inch) or smaller fibers.

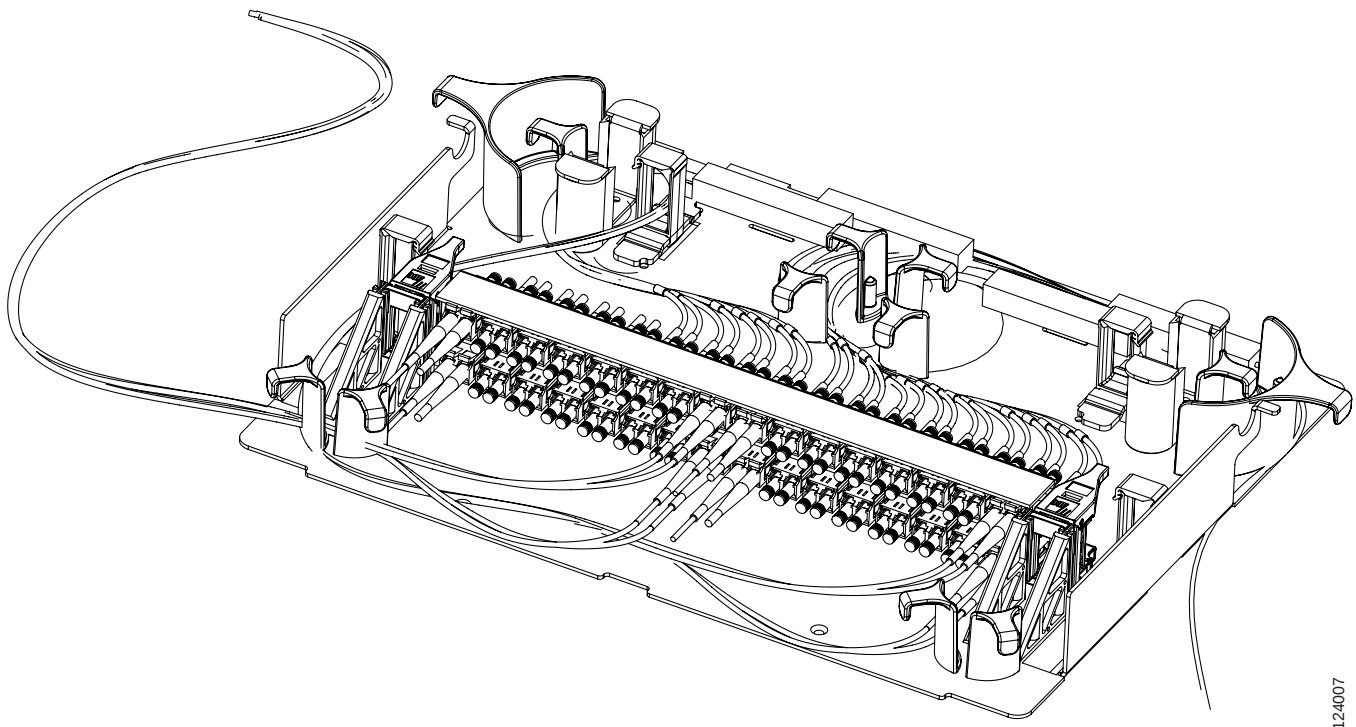
13.10.2 Fiber Management Using the Optional Patch-Panel Module

The patch-panel module manages the connections between multiplexer/demultiplexer and transponder modules by splitting patch cords into single connections. The patch-panel shelf assembly consists of a shelf, pull-out drawer, and drop-in patch-panel module. It can host up to eight ribbon cables (with eight fibers each) entering the drawer or 64 cables (with a maximum outer diameter of 2 mm [0.079 inches]).

Because the patch-panel module can host 64 connections, a hub node will typically require two patch-panel modules, and other DWDM nodes typically require one. The module fits 19- and 23-inch (482.6-mm and 584.2-mm) ANSI racks and 600 mm (23.6 inch) x 300 mm (11.8 inch) ETSI racks, using reversible brackets.

Figure 13-36 shows a fully fibered patch-panel module.

Figure 13-36 Patch-Panel Module



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13.10.3 Fiber Management Using the Optional DWDM Fiber Tray

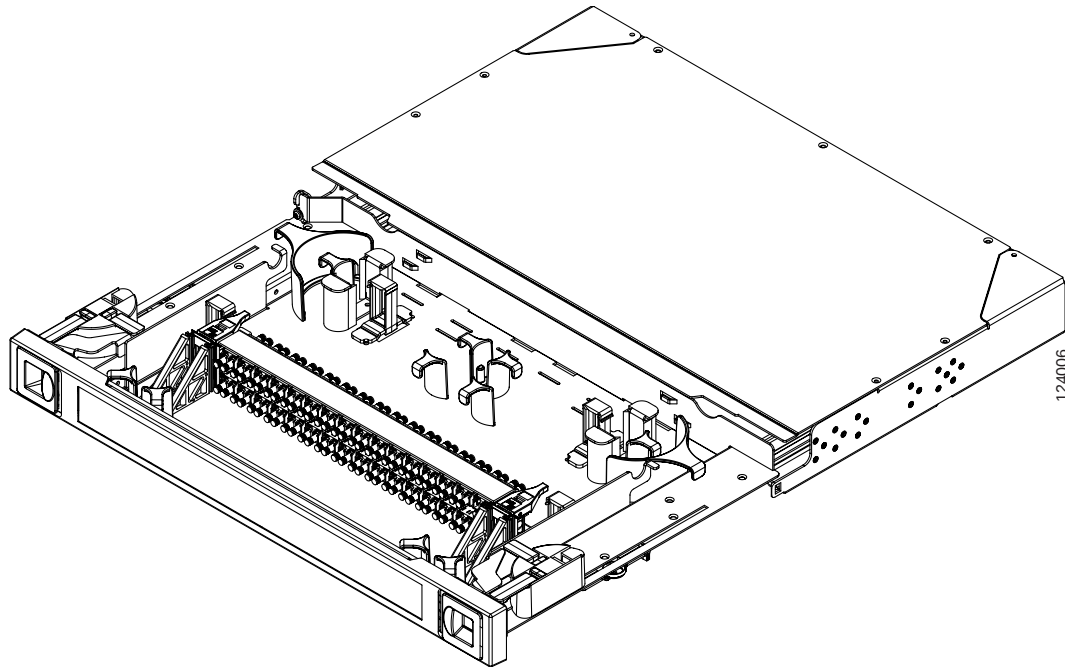
Cisco recommends installing a fiber storage tray in multinode racks to facilitate fiber management for DWDM applications. Refer to Figure 13-15 for typical mounting locations.

Table 13-7 provides the fiber capacity for each tray.

Table 13-7 Fiber Tray Capacity

Fiber Diameter	Maximum Number of Fibers Exiting Each Side
1.6 mm (0.6 inch)	62
2 mm (0.7 inch)	48
3 mm (0.11 inch)	32

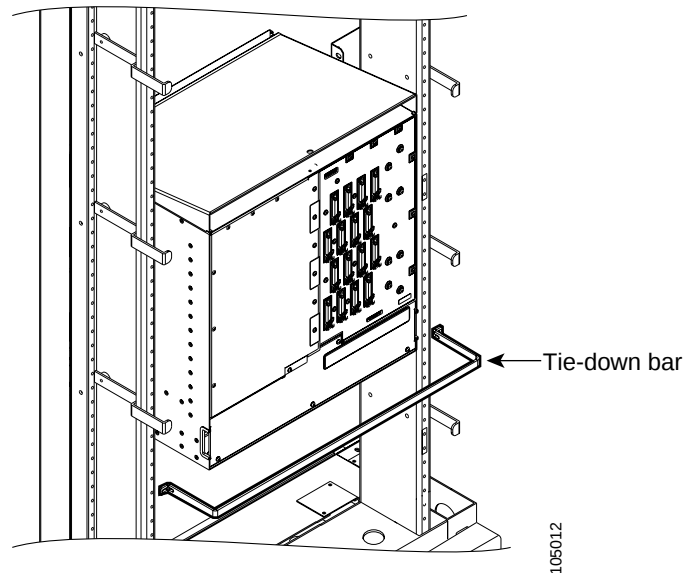
Figure 13-37 shows a DWDM fiber tray.

Figure 13-37 DWDM Fiber Tray

13.10.4 Fiber Management Using the Optional ANSI Tie-Down Bar

You can install a 5-inch (127-mm) tie-down bar on the rear of the ANSI chassis. You can use tie-wraps or other site-specific material to bundle the cabling and attach it to the bar so that you can more easily route the cable away from the rack.

Figure 13-38 shows the tie-down bar, the ONS 15454 ANSI, and the rack.

Figure 13-38 Tie-Down Bar on the Cisco ONS 15454 ANSI Shelf Assembly

13.11 Fan-Tray Assembly

The fan-tray assembly is located at the bottom of the ONS 15454 shelf assembly. The fan tray is a removable drawer that holds fans and fan-control circuitry for the ONS 15454. The front door can be left in place or removed before installing the fan-tray assembly. After you install the fan tray, you should only need to access it if a fan failure occurs or if you need to replace or clean the fan-tray air filter. Refer to [Chapter 11, “Maintain the Node”](#) to clean and replace the fan-tray assembly.

The front of the fan-tray assembly has an LCD screen that provides slot- and port-level information for all card slots, including the number of Critical, Major, and Minor alarms.

The fan-tray assembly features an air filter at the bottom of the tray that you can install and remove by hand. Remove and visually inspect this filter every 30 days and keep spare filters in stock. Refer to [Chapter 11, “Maintain the Node,”](#) for information about cleaning and maintaining the fan-tray air filter.



Caution

Do not operate an ONS 15454 without the mandatory fan-tray air filter.



Caution

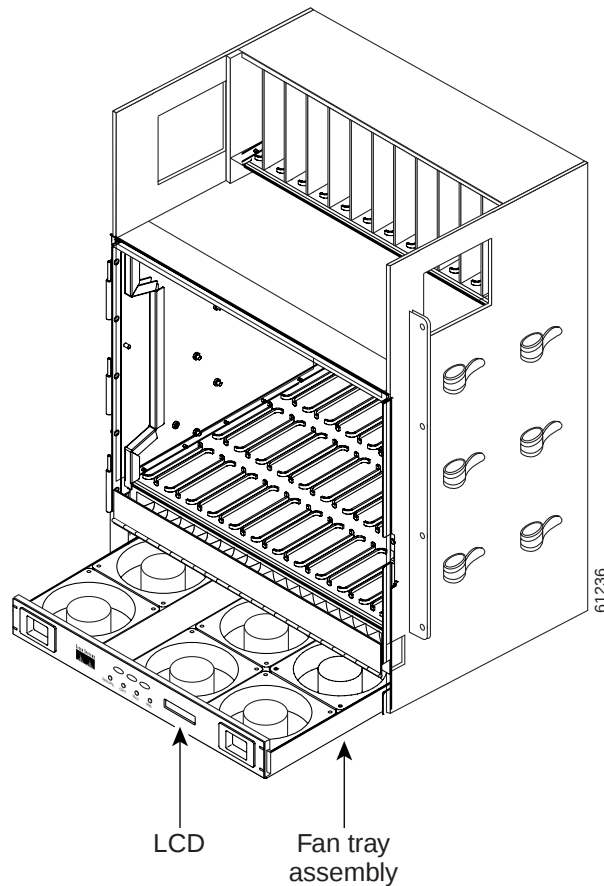
The 15454-FTA3-T fan-tray assembly can only be installed in ONS 15454 Release 3.1 and later shelf assemblies (15454-SA-ANSI, P/N: 800-19857; 15454-SA-HD, P/N: 800-24848). It includes a pin that does not allow it to be installed in ONS 15454 shelf assemblies released before ONS 15454 Release 3.1 (15454-SA-NEBS3E, 15454-SA-NEBS3, and 15454-SA-R1). Equipment damage can result from attempting to install the 15454-FTA3 in a noncompatible shelf assembly.

**Note**

The 15454-FTA3 is not I-temp compliant. To obtain an I-temp fan tray, install the 15454-FTA3-T fan-tray assembly in an ONS 15454 Release 3.1 shelf assembly (15454-SA-ANSI or 15454-SA-HD). However, do not install the ONS 15454 SONET XC10G cross-connect cards with the 15454-FTA2 fan-tray assembly.

See [Figure 13-39](#) for the position of the ONS 15454 ETSI fan-tray assembly.

Figure 13-39 Position of the ONS 15454 ETSI Fan-Tray Assembly



13.11.1 Fan Speed and Power Requirements

Fan speed is controlled by the TCC2 card's temperature sensors. The sensors measure the input air temperature at the fan-tray assembly. Fan speed options are low, medium, and high. If the TCC2 card fails, the fans automatically shift to high speed. The temperature measured by the TCC2 sensors appears on the LCD screen.

[Table 13-8](#) lists power requirements for the fan-tray assembly.

Table 13-8 Fan Tray Assembly Power Requirements

Fan Tray Assembly	Watts	Amps	BTU/Hr
FTA2	53	1.21	198
FTA3 -T	86.4	1.8	295

13.11.2 Fan Failure

If one or more fans fail on the fan-tray assembly, replace the entire assembly. You cannot replace individual fans. The red Fan Fail LED on the front of the fan tray illuminates when one or more fans fail. For fan tray replacement instructions, refer to the *Cisco ONS 15454 SONET and DWDM Troubleshooting Guide*. The red Fan Fail LED clears after you install a working fan tray.

13.11.3 Air Filter

The ONS 15454 contains a reusable air filter (for ANSI: 15454-FTF2; for ETSI: 15454E-ETSI-FTF) that is installed either beneath the fan-tray assembly or, for the ONS 15454 ANSI, in the optional external filter brackets.

The reusable filter is made of a gray, open-cell, polyurethane foam that is specially coated to provide fire and fungi resistance. All versions of the ONS 15454 can use the reusable air filter. Spare filters should be kept in stock. Inspect the air filter every 30 days, and clean the filter every three to six months. Replace the air filter every two to three years. Avoid cleaning the air filter with harsh cleaning agents or solvents.

Earlier versions of the ONS 15454 ANSI shelf used a disposable air filter that is installed beneath the fan-tray assembly only. However, the reusable air filter is backward compatible.

13.12 Power and Ground Description

Ground the equipment according to Telcordia standards or local practices. The following sections describe power and ground for the ONS 15454 shelves.

13.12.1 ONS 15454 ANSI Power and Ground

Cisco recommends the following wiring conventions, but customer conventions prevail:

- Red wire for battery connections (–48 VDC).
- Black wire for battery return connections (0 VDC).
- The battery return connection is treated as DC-I, as defined in Telcordia GR-1089-CORE, Issue 3.

The ONS 15454 ANSI has redundant –48 VDC #8 power terminals on the shelf-assembly backplane. The terminals are labeled BAT1, RET1, BAT2, and RET2 and are located on the lower section of the backplane behind a clear plastic cover.

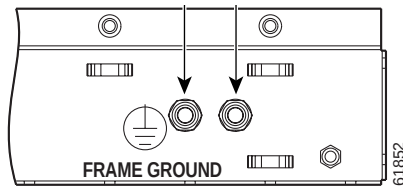
To install redundant power feeds, use four power cables and one ground cable. For a single power feed, only two power cables (#10 AWG, 2.588 mm² [0.1018 inch], copper conductor, 194°F [90°C]) and one ground cable (#6 AWG, 4.115 mm² [0.162 inch]) are required. Use a conductor with low impedance to ensure circuit overcurrent protection. However, the conductor must have the capability to safely conduct any faulty current that might be imposed.

**Note**

If you are installing power on a Release 3.0 ONS 15454 ANSI shelf assembly (15454-SA-NEBS3E, 15454-SA-NEBS3, and 15454-SA-R1), the #12 to #14 AWG (2.053 to 1.628 mm²) power cable and #14 AWG (1.628 mm²) ground cable are required.

The existing ground post is a #10-32 bolt. The nut provided for a field connection is also a #10 AWG (2.588 mm² [0.1018 inch]), with an integral lock washer. The lug must be a dual-hole type and rated to accept the #6 AWG (4.115 mm² [0.162 inch]) cable. Two posts are provided on the ONS 15454 ANSI to accommodate the dual-hole lug. [Figure 13-40](#) shows the location of the ground posts.

Figure 13-40 Ground Posts on the ONS 15454 ANSI Backplane



13.12.2 ONS 15454 ETSI Power and Ground

The ONS 15454 ETSI has redundant –48 VDC power connectors on the MIC-A/P and MIC-C/T/P faceplates.

To install redundant power feeds, use the two power cables shipped with the ONS 15454 ETSI and one ground cable.

For details, see the [“14.3.1 MIC-A/P FMEC” section on page 14-21](#) and the [“14.3.2 MIC-C/T/P FMEC” section on page 14-24](#).

**Caution**

Only use the power cables shipped with the ONS 15454 ETSI.

13.13 ONS 15454 ANSI Alarm, Timing, LAN, and Craft Pin Connections

Pin connections are provided on the ONS 15454 ANSI backplane. For information about ONS 15454 ETSI connections, see the [“13.8 ONS 15454 ETSI Front Mount Electrical Connection” section on page 13-30](#).

**Caution**

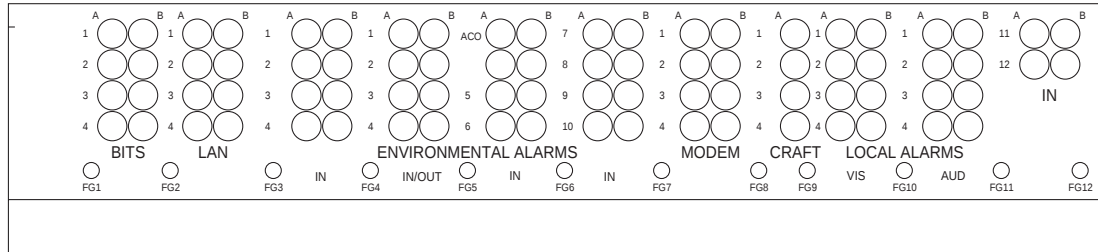
Always use the supplied ESD wristband when working with a powered ONS 15454. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.

The ONS 15454 ANSI has a backplane pin field located at the bottom of the backplane. The backplane pin field provides 0.045 inch² (29 mm²) wire-wrap pins for enabling external alarms, timing input and output, and craft interface terminals. This section describes the backplane pin field and the pin assignments for the field. [Figure 13-41](#) shows the wire-wrap pins on the backplane pin field. Beneath each wire-wrap pin is a frame ground pin. Frame ground pins are labeled FG1, FG2, FG3, etc. Install the ground shield of the cables connected to the backplane to the ground pin that corresponds to the pin field used.

**Note**

The AIC-I requires a shelf assembly running Software Release 3.4.0 or later. The backplane of the ANSI shelf contains a wire-wrap field with pin assignment according to the layout in [Figure 13-41](#). The shelf assembly might be an existing shelf that has been upgraded to R3.4 or later. In this case the backplane pin labeling appears as indicated in [Figure 13-42 on page 13-47](#), but you must use the pin assignments provided by the AIC-I as shown in [Figure 13-41](#).

Figure 13-41 ONS 15454 ANSI Backplane Pinouts (Release 3.4 or Later)

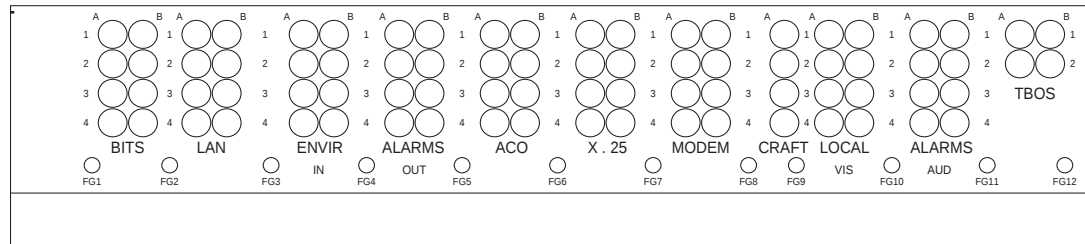


Field	Pin	Function	Field	Pin	Function	
BITS	A1	BITS Output 2 negative (–)	ENVIR ALARMS IN/OUT	A1/A13	Normally open output pair number 1	
	B1	BITS Output 2 positive (+)		B1/B13		
	A2	BITS Input 2 negative (–)	A2/A14	Normally open output pair number 2		
	B2	BITS Input 2 positive (+)	B2/B14			
	A3	BITS Output 1 negative (–)	A3/A15	Normally open output pair number 3		
	B3	BITS Output 1 positive (+)	B3/B15			
	A4	BITS Input 1 negative (–)	A4/A16	Normally open output pair number 4		
	B4	BITS Input 1 positive (+)	B4/B16			
LAN	Connecting to a hub, or switch		ACO	A1	Normally open ACO pair	
	A1	RJ-45 pin 6 RX–		B1		
	B1	RJ-45 pin 3 RX+	CRAFT	A1	Receive (PC pin #2)	
	A2	RJ-45 pin 2 TX–		A2	Transmit (PC pin #3)	
	B2	RJ-45 pin 1 TX+		A3	Ground (PC pin #5)	
	Connecting to a PC/Workstation or router			A4	DTR (PC pin #4)	
	A1	RJ-45 pin 2 RX–	LOCAL ALARMS AUD (Audible)	A1	Alarm output pair number 1: Remote audible alarm.	
	B1	RJ-45 pin 1 RX+		B1		
	A2	RJ-45 pin 6 TX–		A2	Alarm output pair number 2: Critical audible alarm.	
	B2	RJ-45 pin 3 TX+		B2		
	ENVIR ALARMS IN	A1	Alarm input pair number 1: Reports closure on connected wires.	N/O	A3	Alarm output pair number 3: Major audible alarm.
		B1			B3	
A2		Alarm input pair number 2: Reports closure on connected wires.	A4		Alarm output pair number 4: Minor audible alarm.	
B2			B4			
A3		Alarm input pair number 3: Reports closure on connected wires.	LOCAL ALARMS VIS (Visual)	A1	Alarm output pair number 1: Remote visual alarm.	
B3				B1		
A4		Alarm input pair number 4: Reports closure on connected wires.		A2	Alarm output pair number 2: Critical visual alarm.	
B4				B2		
A5		Alarm input pair number 5: Reports closure on connected wires.	N/O	A3	Alarm output pair number 3: Major visual alarm.	
B5				B3		
A6		Alarm input pair number 6: Reports closure on connected wires.		A4	Alarm output pair number 4: Minor visual alarm.	
B6				B4		
A7		Alarm input pair number 7: Reports closure on connected wires.				
B7						
A8		Alarm input pair number 8: Reports closure on connected wires.				
B8						
A9	Alarm input pair number 9: Reports closure on connected wires.					
B9						
A10	Alarm input pair number 10: Reports closure on connected wires.					
B10						
A11	Alarm input pair number 11: Reports closure on connected wires.					
B11						
A12	Alarm input pair number 12: Reports closure on connected wires.					
B12						

If you are using an AIC-I card, contacts provisioned as OUT are 1-4. Contacts provisioned as IN are 13-16.

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Figure 13-42 ONS 15454 ANSI Backplane Pinouts



Field	Pin	Function	Field	Pin	Function
BITS	A1	BITS Output 2 negative (-)	ENVIR ALARMS OUT N/O	A1	Normally open output pair number 1
	B1	BITS Output 2 positive (+)		B1	
	A2	BITS Input 2 negative (-)		A2	Normally open output pair number 2
	B2	BITS Input 2 positive (+)		B2	
	A3	BITS Output 1 negative (-)		A3	Normally open output pair number 3
	B3	BITS Output 1 positive (+)		B3	
	A4	BITS Input 1 negative (-)		A4	Normally open output pair number 4
	B4	BITS Input 1 positive (+)		B4	
LAN	Connecting to a hub, or switch		ACO	A1	Normally open ACO pair
	A1	RJ-45 pin 6 RX-		B1	
	B1	RJ-45 pin 3 RX+	CRAFT	A1	Receive (PC pin #2)
	A2	RJ-45 pin 2 TX-		A2	Transmit (PC pin #3)
	B2	RJ-45 pin 1 TX+		A3	Ground (PC pin #5)
	Connecting to a PC/Workstation or router			A4	DTR (PC pin #4)
	A1	RJ-45 pin 2 RX-	LOCAL ALARMS AUD (Audible)	A1	Alarm output pair number 1: Remote audible alarm.
	B1	RJ-45 pin 1 RX+		B1	
	A2	RJ-45 pin 6 TX-		A2	Alarm output pair number 2: Critical audible alarm.
	B2	RJ-45 pin 3 TX+		B2	
ENVIR ALARMS IN	A1	Alarm input pair number 1: Reports closure on connected wires.	N/O	A3	Alarm output pair number 3: Major audible alarm.
	B1			B3	Alarm output pair number 3: Major audible alarm.
	A2	Alarm input pair number 2: Reports closure on connected wires.		A4	Alarm output pair number 4: Minor audible alarm.
	B2			B4	Alarm output pair number 4: Minor audible alarm.
	A3	Alarm input pair number 3: Reports closure on connected wires.	LOCAL ALARMS VIS (Visual)	A1	Alarm output pair number 1: Remote visual alarm.
	B3			B1	Alarm output pair number 1: Remote visual alarm.
	A4	Alarm input pair number 4: Reports closure on connected wires.		A2	Alarm output pair number 2: Critical visual alarm.
	B4			B2	Alarm output pair number 2: Critical visual alarm.
			N/O	A3	Alarm output pair number 3: Major visual alarm.
				B3	Alarm output pair number 3: Major visual alarm.
				A4	Alarm output pair number 4: Minor visual alarm.
				B4	Alarm output pair number 4: Minor visual alarm.

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13.13.1 Alarm Contact Connections

The alarm pin field supports up to 17 alarm contacts, including four audible alarms, four visual alarms, one alarm cutoff (ACO), and four user-definable alarm input and output contacts.

Audible alarm contacts are in the LOCAL ALARM AUD pin field and visual contacts are in the LOCAL ALARM VIS pin field. Both of these alarms are in the LOCAL ALARMS category. User-definable contacts are in the ENVIR ALARM IN (external alarm) and ENVIR ALARM OUT (external control) pin fields. These alarms are in the ENVIR ALARMS category; you must have the AIC card installed to use the ENVIR ALARMS. Alarm contacts are Normally Open (N/O), meaning that the system closes the alarm contacts when the corresponding alarm conditions are present. Each alarm contact consists of two wire-wrap pins on the shelf assembly backplane. Visual and audible alarm contacts are classified as Critical, Major, Minor, and Remote. [Figure 13-42 on page 13-47](#) shows alarm pin assignments.

Visual and audible alarms are typically wired to trigger an alarm light or bell at a central alarm collection point when the corresponding contacts are closed. You can use the ACO pins to activate a remote ACO for audible alarms. You can also activate the ACO function by pressing the ACO button on the TCC2 card faceplate. The ACO function clears all audible alarm indications. After clearing the audible alarm indication, the alarm is still present and viewable in the Alarms tab in CTC.

13.13.2 Timing Connections

The ONS 15454 ANSI backplane supports two building integrated timing supply (BITS) clock pin fields. The first four BITS pins, rows 3 and 4, support output and input from the first external timing device. The last four BITS pins, rows 1 and 2, perform the identical functions for the second external timing device. [Table 13-9](#) lists the pin assignments for the BITS timing pin fields.



Note

For timing connection, use 100-ohm shielded BITS clock cable pair #22 or #24 AWG (0.51 mm² [0.020 inch] or 0.64 mm² [0.0252 inch]), twisted-pair T1-type.

Table 13-9 BITS External Timing Pin Assignments

External Device	Contact	Tip and Ring	Function
First external device	A3 (BITS 1 Out)	Primary ring (–)	Output to external device
	B3 (BITS 1 Out)	Primary tip (+)	Output to external device
	A4 (BITS 1 In)	Secondary ring (–)	Input from external device
	B4 (BITS 1 In)	Secondary tip (+)	Input from external device
Second external device	A1 (BITS 2 Out)	Primary ring (–)	Output to external device
	B1 (BITS 2 Out)	Primary tip (+)	Output to external device
	A2 (BITS 2 In)	Secondary ring (–)	Input from external device
	B2 (BITS 2 In)	Secondary tip (+)	Input from external device



Note

Refer to Telcordia SR-NWT-002224 for rules about provisioning timing references.

13.13.3 LAN Connections

Use the LAN pins on the ONS 15454 ANSI backplane to connect the ONS 15454 ANSI to a workstation or Ethernet LAN, or to a LAN modem for remote access to the node. You can also use the LAN port on the TCC2 faceplate to connect a workstation or to connect the ONS 15454 ANSI to the network. [Table 13-10](#) shows the LAN pin assignments.

Before you can connect an ONS 15454 ANSI to other ONS 15454 ANSI shelves or to a LAN, you must change the default IP address that is shipped with each ONS 15454 ANSI (192.1.0.2).

Table 13-10 LAN Pin Assignments

Pin Field	Backplane Pins	RJ-45 Pins
LAN 1 Connecting to data circuit-terminating equipment (DCE ¹ , a hub or switch)	B2	1
	A2	2
	B1	3
	A1	6
LAN 1 Connecting to data terminal equipment (DTE) (a PC/workstation or router)	B1	1
	A1	2
	B2	3
	A2	6

1. The Cisco ONS 15454 ANSI is DCE.

13.13.4 TL1 Craft Interface Installation

You can use the craft pins on the ONS 15454 ANSI backplane or the EIA/TIA-232 port on the TCC2 faceplate to create a VT100 emulation window to serve as a TL1 craft interface to the ONS 15454 ANSI. Use a straight-through cable to connect to the EIA/TIA-232 port. [Table 13-11](#) shows the pin assignments for the CRAFT pin field.



Note

You cannot use the craft backplane pins and the EIA/TIA-232 port on the TCC2 card simultaneously.

Table 13-11 Craft Interface Pin Assignments

Pin Field	Contact	Function
Craft	A1	Receive
	A2	Transmit
	A3	Ground
	A4	DTR

13.14 Cards and Slots

ONS 15454 cards have electrical plugs at the back that plug into electrical connectors on the shelf assembly backplane. When the ejectors are fully closed, the card plugs into the assembly backplane. [Figure 13-43](#) shows card installation for an ONS 15454 ANSI shelf.

Figure 13-43 Installing Cards in the ONS 15454 ANSI

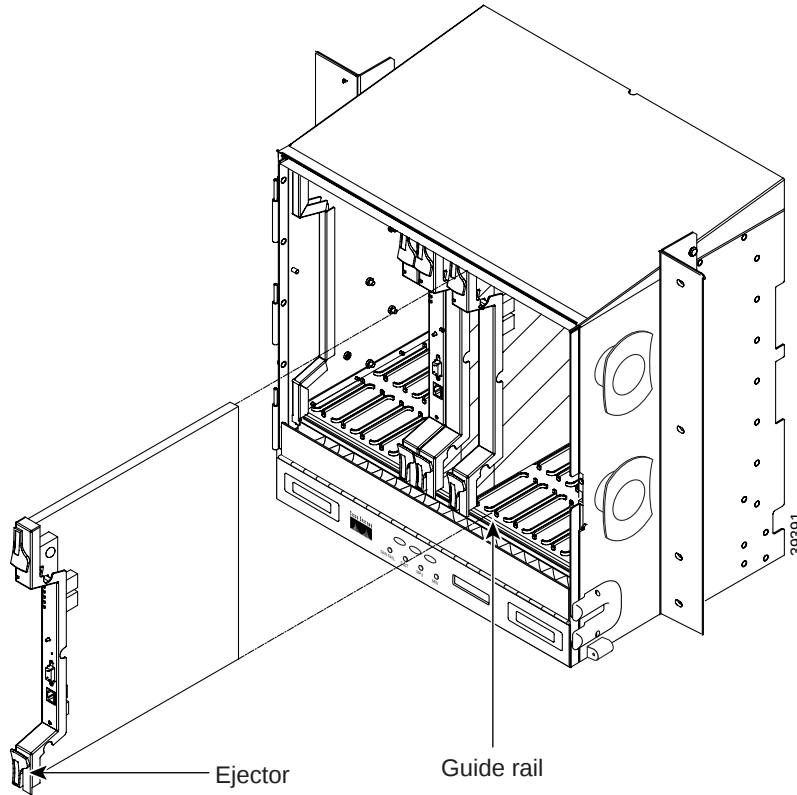
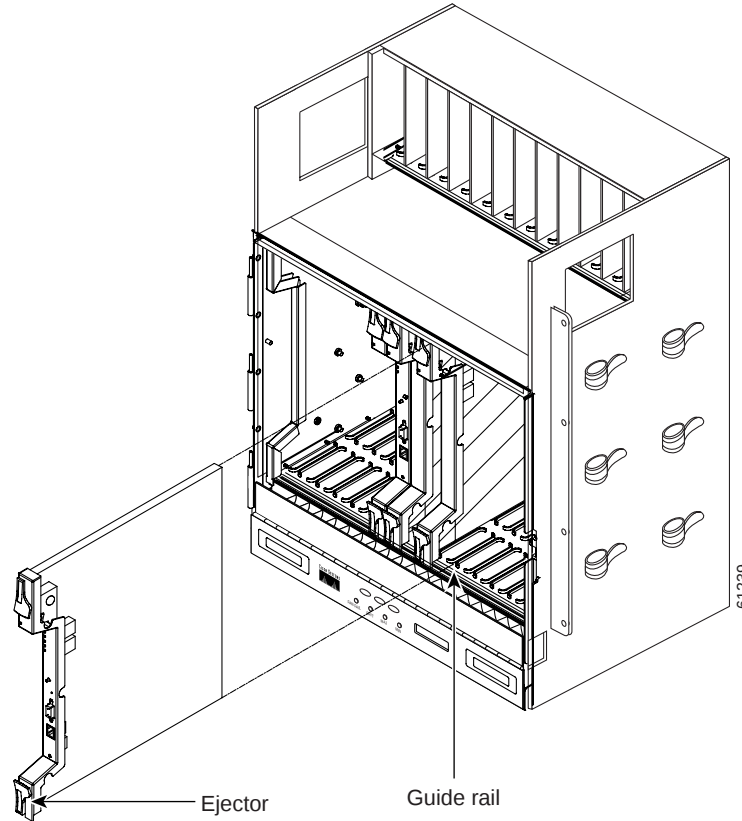


Figure 13-44 shows card installation in the ONS 15454 ETSI shelf.

Figure 13-44 Installing Cards in the ONS 15454 ETSI Shelf

13.14.1 Card Slot Requirements

The ONS 15454 shelf assemblies have 17 card slots numbered sequentially from left to right. Slots 7 and 11 are dedicated to TCC2 cards. Slot 9 is reserved for the optional AIC or AIC-I card.



Caution

Do not operate the ONS 15454 with a single TCC2 card. Always operate the shelf assembly with one working and one protect card of the same type.

Shelf assembly slots have symbols indicating the type of cards that you can install in them. Each ONS 15454 card has a corresponding symbol. The symbol on the card must match the symbol on the slot.

[Table 13-12](#) shows the slot and card symbol definitions.

Table 13-12 Slot and Card Symbols

Symbol Color/Shape	Definition
Orange/Circle	Slots 1 to 6 and 12 to 17. Only install cards with a circle symbol on the faceplate.
Blue/Triangle	Slots 5, 6, 12, and 13. Only install cards with circle or a triangle symbol on the faceplate.

Table 13-12 Slot and Card Symbols (continued)

Symbol Color/Shape	Definition
Purple/Square	TCC2 slot, Slots 7 and 11. Only install cards with a square symbol on the faceplate.
Green/Cross	Cross-connect (XC/XCVT/XC10G) slot, Slots 8 and 10. Only install ONS 15454 cards with a cross symbol on the faceplate.
Red/P	Protection slot in 1:N protection schemes.
Red/Diamond	AIC/AIC-I slot, Slot 9. Only install cards with a diamond symbol on the faceplate.
Gold/Star	Slots 1 to 4 and 14 to 17. Only install cards with a star symbol on the faceplate.
Blue/Hexagon	(Only used with the 15454-SA-HD shelf assembly.) Slots 3 and 15. Only install ONS 15454 ANSI cards with a blue hexagon symbol on the faceplate.

13.14.2 Card Replacement

To replace an ONS 15454 card with another card of the same type, you do not need to make any changes to the database; remove the old card and replace it with a new card. To replace a card with a card of a different type, physically remove the card and replace it with the new card, then delete the original card from CTC. For specifics, see [Chapter 11, “Maintain the Node.”](#)



Caution

Removing any active card from the ONS 15454 can result in traffic interruption. Use caution when replacing cards and verify that only inactive or standby cards are being replaced. If the active card needs to be replaced, switch it to standby prior to removing the card from the node. For traffic switching procedures, refer to the [“DLP-G179 Apply a Force Y-Cable or Splitter Protection Switch” task on page 9-24.](#)



Note

An improper removal (IMPROPRMVL) alarm is raised whenever a card pull (reseat) is performed, unless the card is deleted in CTC first. The alarm clears after the card replacement is complete.



Warning

Do not reach into a vacant slot or chassis while you install or remove a module or a fan. Exposed circuitry could constitute an energy hazard.

13.15 Ferrites (ANSI Only)

Place third-party ferrites on certain cables to dampen electromagnetic interference (EMI) from the ONS 15454 ANSI. Ferrites must be added to meet the requirements of Telcordia GR-1089-CORE. Refer to the ferrite manufacturer documentation for proper use and installation of the ferrites. Ferrite placements on the ONS 15454 ANSI can include power cables, AMP Champ connectors, baluns, BNC/SMB connectors, and the wire-wrap pin field.